

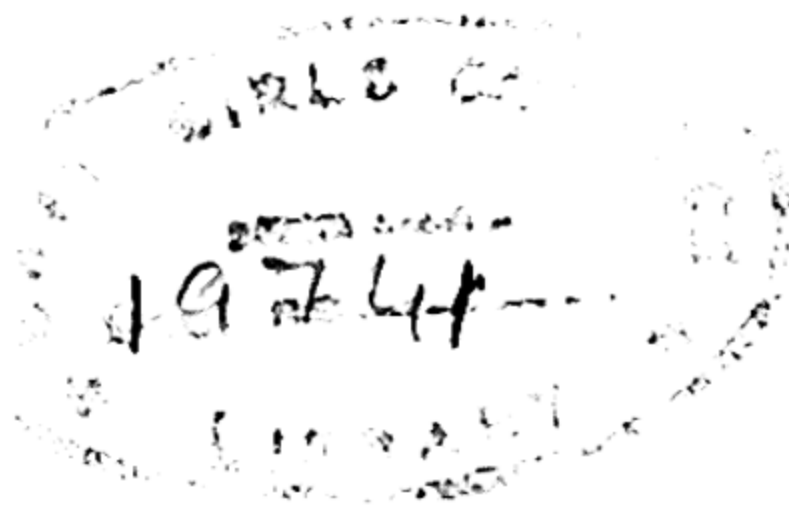
PRINCIPLES OF HUMAN GEOGRAPHY

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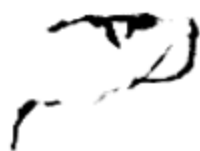
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PREFACE

Human geography as a definite branch of geography is of recent growth. The conception of this branch of geographical knowledge is not entirely new to Indian geographers, yet no efforts were made to introduce it as a part of geography syllabus in the Indian universities. In recent years its importance is being increasingly recognised and quite a few universities have introduced it at one stage or the other. This is probably the first book on Human geography being published in India.

The study of Human geography is fascinating as is the story of man's achievements and adjustments. It is the history of man and the earth studied together. Natural environment and human facts are two separate forces yet those are very closely knit. It is the harmony between the two which gives a new face to this earth. Their relationship is very complex as both are living. Human geography has therefore been described as the "study of relationship between the unresting man and the unstable earth."

The cultural achievements of man thus form the subject matter of Human geography. In this book every effort has been made to explain the growth of ideas on Human geography along with man's achievements in the field of occupations, settlements, communications and resultant population patterns.

No originality is claimed for this work. Yet the chapters on the races, tribes, languages and religions with special reference to India can make a definite case for originality. There is scope for improvement and therefore every suggestion to enhance the volume of the present work will be thankfully acknowledged.

The Authors

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Meaning & Scope of Human Geography

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Religion

CHAPTER 1

6312 63124 AIMS AND SCOPE OF HUMAN GEOGRAPHY

63124 It is increasingly recognised that the problems which press so relentlessly upon mankind to-day are fundamentally a result of the necessity for making satisfactory adjustment between human behaviour and the conditions imposed by the environment within which man must live. There is of course the age-old paradox of the individual in society—a paradox which becomes ever more poignant as the number of individuals increases toward the maximum which can be supported by the limited resources of the earth and as the social unit expands until it includes all men everywhere. But even that paradox is a phase of adjustment between the creature, man and the environment, the earth. Thus geography reveals itself to an interpretation of the relation between the life of man and the elements, factors and forces of nature.

Human geography studies man's adjustments to the natural environment, the varied and peculiar ways in which he conforms or adapts his life, either wholly or in part, to physical and organic nature.) In some areas man's adjustments are simple and direct; in other areas, complex and indirect. But wherever mankind has established relationships to the natural environment, those relationships are geographical.

Man adjusts himself to his ^{environment} milieu in a multitude of ways. His works and their relationships to the natural environment are apparently innumerable.) But for our purpose, to grasp the full proposition and to understand the subject in a better way, we take after Huntington, a case of a logging camp in the Cascade Mountains of Washington, which might be cited as one type of human group. Such a community consists usually of a commissary, a headquarters building, bank houses for the unmarried labourers and several rows of small shacks for the married men and their families. These buildings are huddled in stark, unpainted disarray upon a bit of terrace land along the spur of railway which provides contact with the outside world. Below the camp, a mountain flanks buried under a cover of green forest. Here and there, scarring the mountains, are ugly denuded patches littered with stumps, rejected logs, scraps of bark, and piles of trimmings, long cables run from the dock engines far up the slopes where gangs of workmen labour lustily and profanely with axe and peavey. The thud of axes, the clash of falling trees, the thunder of logs coming down the skidway, the rattle of tractor and dragline and the tool of the engines create a veritable bedlam of noise and seeming indirection.)

The logging camp, as a social unit, exists solely to slaughter

the forest. Its inhabitants think, talk and live in terms of logs. The ups and downs of the lumber market are matters of paramount public interest, for upon them depend not only the prosperity but, at times, the very existence of the community. Whenever such a social unit is contemplated, a definite picture arises in one's mind, because of the basic geographical factors involved. The appearance and social traits of such a community are of course a result of the technological processes involved in the logging industry. These industrial processes are in turn related to the element of the natural environment being used, in this case, the forest, which itself is related to the specific qualities of climate, soil and relief in a particular region.

Thus an understanding of the nature of logging community is really bound up in a complex set of relations between man, his activities and the natural environment. These relations are the essence of geography. An equivalent, but different set of relations underlies every other type of human society or community to be found on the earth. For this reason, human geography may be defined as a "Science of Relationships". It is, therefore, concerned chiefly with the discovery of cause and effect in the reactions of mankind to environment.

This relationship of man and nature is the substance of human geography. Both man and nature are living and changing, therefore, their relationship is complex. In the words of Miss Semple, "Human geography is the study of the changing relationship between the unresting man and the unstable earth". This relationship is complex because man is both active and passive at one and the same time and it becomes quite difficult to distinguish as to when he is one or the other."

It is not an individual but a group which is taken into consideration for the classification of human activity in a given physical set-up. This contact not only gives a definite colour to the landscape but also influences cultural landscape and growth of ideas. According to Vidal de la Blache, "Human geography is a recent sprout from venerable trunk of geographical science It is expression of a growth of ideas rather than immediate, one might say, material result of discovery and the extension of the geographical knowledge."

Man is a part of the environment, a changer, a modifier and a factor in himself. He lives on this earth, from the earth and as a part of it. The living earth has a definite life-history changing gradually from one form to the other. Man and his activities have also passed through a series of forms—from primitive to modern. In this form of transformation all the objects are decreasing or increasing whereas the ideas are becoming more and more complex due to combined experience gained by

man throughout the world. In the words of White and Reuner, "Geography is primarily human ecology, and the study of human society in relation to the earth background."

Miss Semple is the exponent of the Ratzellian school explaining the 'Environmentalism and Possibilism'. In her words, "Man is a product of the earth surface. This means not merely that he is a child of the earth, dust of her dust; but that the earth has mothered him, fed him, set his tasks, directed his thoughts, confronted him with difficulties that have strengthened his body and sharpened his wits, given him his problems of irrigation and navigation and at the same time whispered hints for their solution. She has entered into his bone and tissue, into his mind and soul. On the mountains, she has given him leg muscles of iron to climb the slope; along the coast, she has left them weak and flabby, but given him instead vigorous development of chest and arm to handle his paddle and oar. In the river valley she attaches him to the fertile soil, circumscribes his ideas and ambitions by a dull round of calm, exacting duties, narrows his outlook to the cramped horizon of his farm." Nature has its limitations. Man in a group is engaged in solving the problems of his immediate surroundings—an environment which has certain possibilities of development and utilization. Febver has shown impact of these possibilities saying "there are no necessities, but everywhere possibilities and man as a master of these possibilities is a judge of their use." Man utilizes his geographical circumstances according to race ability and takes advantage of geographical possibilities. He cannot escape the hold of environment. He commands nature by obeying her. His efforts to conquer nature are continuing but at the same time he is co-operating with nature to live in a given surrounding. The human activity varies even in the same region but even with the best efforts man cannot altogether escape the environment. All his actions are therefore limited to the geographical possibilities of the area.

Scope of the Subject. The field of geographical study in our view consists of the lower zone of the atmosphere surrounding the earth, and the superficial zone of the solid crust. At all points where these two zones come in contact three groups of phenomena are produced:

(A) The solar heat is the necessary condition of all activities and life. Its greatest effect is felt in the zone of contact where the earth's crust and the atmosphere meet.

(B) Again, it is in the zone of contact, i.e., where atmosphere and the earth's crust coincide, that the great atmospheric phenomena, variations of temperature, rains and winds and all other geographical facts which result from these are unceasingly at work to change the face of the earth.

(C) *Lastly*, it is on the surface of the globe and in the lower portion of the atmosphere that all phenomena of plant, animal and human life are concentrated. Even the birds which fly high in the sky come back to the earth to rest and feed. Even fish and invertebrates also live comparatively very near the surface. Even man's abode is found on the earth.

But our experience shows that most of these phenomena are in no way influenced by human activities. They have the least human bearing. Whether man exists or not water will still evaporate under the action of the solar heat, and the vapour thus caused will rise, expand, cool and precipitate. Whether man exists or not running water will still corrode valleys, erode the material and finally deposit it in the sea, ocean or lake. Whether man exists or not the ice filled in crevices will exert pressure due to expansion in the day and contraction in the night and rocks will be blown to pieces. The glaciers will always smooth their rough beds, the wind withstand will rupture the rocks, the waves of the sea will cause cliffs to crumble and the whole surface of the earth, raised or submerged, will show changes due to the physical agents that have worked upon it. Even a considerable part of the animal life and plant life also escapes the influence of man. Coniferous type of larch, fir and spruce can only thrive best in cold regions. They cannot be grown in hot climate. Man cannot alter the destiny, which nature has destined for him. Fish will only live in water, lions in jungle, while cows in rich meadows.

Man by his superior wits and ingenuity may succeed here and there in his attempts to overcome the obstacles put forward by nature, but there are certain causal forces in existence which he cannot control, and which, in turn, while they do not control him, do certainly set the broad limits to what he may do and accomplish at any time and place.

But if we cast a general glance over any region of the earth and examine it geographically, it may be seen to contain more of the cultural landscape rather than the natural landscape it possesses. When people invade a natural landscape of any region, however, they at once begin to adjust themselves to it. They commence the active exploitation of one or more of the environmental elements; they draw upon the stored natural resources for the materials with which to construct the natural landscape; they capitalize upon those natural factors which aid in promoting social solidarity. In the process of adjustment through selection and adaptation, man may transform many of the surface aspects of the natural landscape that after a time it becomes obscured or even unrecognizable. Man may dig the minerals, cut down the trees, destroy the wild game, harness the

streams for power, navigation and irrigation and cover the surface with farms, towns, mills, factories and other varieties of his culture.

All these facts lead one to think the inevitability of the dominating role of human-beings in the realm of nature. "The assembly of all these facts in which human activity has a part forms a truly special group of surface phenomena—a complex group of facts infinitely variable and varied, always contained within the limits of Physical Geography, but having always the easily discernible characteristic of being related more or less directly to man; and to the study of this specific group of geographical facts we give the name Human Geography".¹

Aims of Human Geography. Modern geography recognises a great link between the forces of natural environment and every aspect of man's life. Therefore, human facts and natural phenomena in a way cannot be separated. Though they are at best two forces, but their importance lies in harmony. It is the harmony and the existing causal relationship, which speaks of sciences that exist in one way or the other upon the globe. But here we are not concerned to study all the relationships which arise out of the harmony between man and nature. They are at best studied by various Social Sciences, i.e., Sociology, Anthropology, History, Economics and Politics, etc. Ours is the aim only to study human elements in relation to geographical factors, which enter into the different problems of our daily life. Therefore *(the aim of human geography is only to study cultural features and man-made features on the earth, i.e., population density and distributional houses and settlements—dispersed or agglomerated—agriculture of all types, crops—animal specialization, manufacturing, various industries like fishing, mining, hunting and the features associated with transportation and trade, foreign or domestic. Human geography thus becomes the study of cultural surface, which man has very ingeniously carved out on the earth.*

ELEMENTS OF HUMAN GEOGRAPHY

In spite of the vast number and great complexity of the problems of human geography, they can be classified into a few main types, as follows²:—

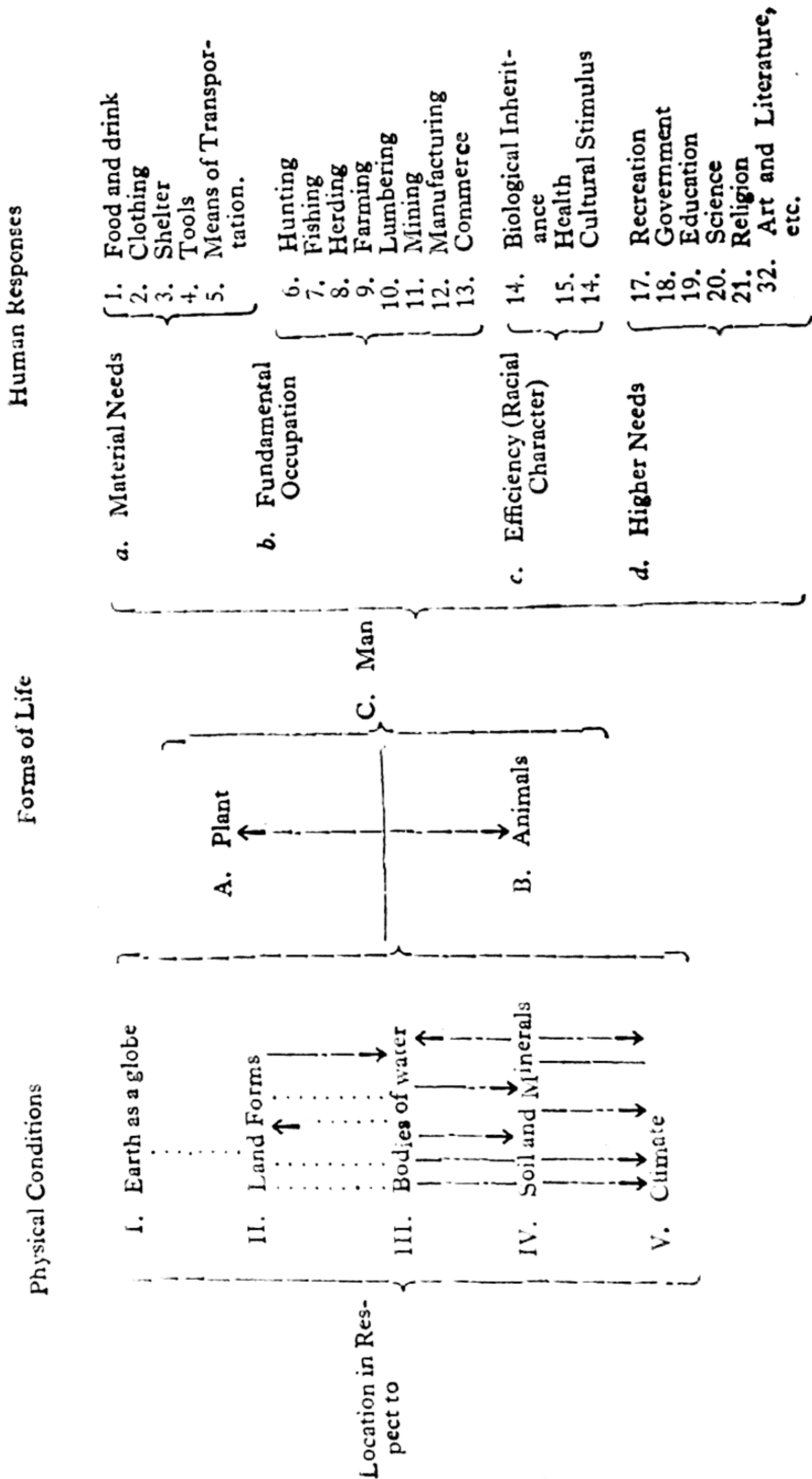
¹ Bruhnes, *Principles of Human Geography*, 1952, p. 4.

² E. Huntington, *Principles of Human Geography*, 1947, p. 4.

A

ELEMENTS OF HUMAN GEOGRAPHY

PRINCIPLES OF HUMAN GEOGRAPHY



According to Finch and Trewartha, the distinctive geographic character of any portion of the earth's surface is determined by the combined patterns of a really associated natural and man-made features, as will be clear from the schematic representation given below³:—

GEOGRAPHY (Science of Earth's Surface)

- | | |
|--|--|
| <p>I. Physical or Natural Features</p> <p>1. Climate:</p> <p>(a) Temperature</p> <p>(b) Precipitation</p> <p>(c) Type of climate</p> <p>2. Surface configuration and drainage:</p> <p>(a) Earth materials—nature of underlying rocks</p> <p>(b) Principal land form groups — Plains, Plateaus, Hill country, Mountains</p> <p>(c) Surface features of smaller size</p> <p>(d) Drainage</p> <p>3. Earth Resources:</p> <p>(a) Water resources</p> <p>(b) Native Vegetation—Forests, Grass, Shrubs</p> <p>(c) Soils</p> <p>(d) Economic minerals.</p> | <p>II. Cultural or Man-Made Features</p> <p>1. Population:</p> <p>(a) Density</p> <p>(b) Distribution patterns</p> <p>2. Houses and Settlements:</p> <p>(a) House Types</p> <p>(b) Settlements and kinds.</p> <p>3. Features associated with production:</p> <p>(a) Agriculture:</p> <p>(1) Size and layout of farms and fields</p> <p>(2) Crop or animal specialisation</p> <p>(3) Distribution pattern of agricultural land</p> <p>(4) Types of agriculture</p> <p>(b) Manufacturing:</p> <p>(1) Industrial plant</p> <p>(2) Raw materials</p> <p>(3) Manufactural Regions of the world</p> <p>(c) Extractive Industries</p> <p>(1) Logging, Fishing</p> <p>(2) Hunting & Trapping</p> <p>(3) Mining</p> <p>4. Features associated with Transportation:</p> <p>(a) Routes of Travel—density and patterns</p> <p>(b) The carriers</p> <p>(c) The things transported.</p> |
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³ Simplified from Finch and Trewartha's, *Elements of Geography*, 1952, pp. 2-3.

Every layman in the street knows that men are not similar in their physical appearance, dress, manners and ideals. They differ like anything. Even those differences will look very marked when we happen to come in contact with the different peoples, of the different parts of the earth. They get different kinds of food, vary in dress and manners, their occupations are different, and build houses that vary from mud, thatched huts to great mansions kissing the sky and enjoy pleasures as diverse as hunting and cinema going. They differ in their ways of work and morals. Differences in language, government, education and religion are equally conspicuous. Then some people are tall, fair-haired, active and inventive, while others like Pygmies are dwarfs, black-haired and indolent. Some people like Indians wear cotton clothes, Europeans woollen clothes, Eskimos skin and fur clothes while Pygmies wear no clothes at all. The English are well-behaved, civilized and are of high character but people of Central Australia are barbarous, uncivilized and of primitive type. Some believe in Christian religion, others in Mohammedanism, Hinduism or Buddhism. Some of these differences are biological, while others are cultural and still other differences belong to physical environment. People can mine copper only where there is copper-ore in the ground, collect jack-fruits where they are luxuriant, cut timbers where nature helps their growth. So all these differences are the subject-matter of human geography.

Human Geography and the other Social Sciences. What distinguishes one science from another is not so much its mood and purpose as its subject-matter—the phenomena studied. Man is such a versatile creature and the phenomena of the society and nature to be studied is so immense and complicated that it was inevitable that many scientific disciples should emerge as investigators to examine the whole field of social and natural environment. But whether inevitable or not, scores of sciences dealing with man and his cultural achievements are here, and we are to take note of some among them.

Sociology and Human Geography. Human geography studies man in relation to his environment. So here we study what is called 'human ecology', which is the natural history of man in relation to his environment. While Sociology studies people and their behaviours in relation to group, it studies people of every place, kind and nature, which cannot be better understood in absence of geographical knowledge. Its knowledge is essential because it plays a dominant role in framing the culture of the people.

As we know that geographical environment, i.e., distance from the sea, nature of the soil, latitude, longitude, altitude, wind

direction, rainfall, mineral and vegetable resources, water resources, plains, forests and deserts and climate play a very important part in determining the density of population, the industrial character, customs, folkways and mores, languages, arts, religion and types of culture. Therefore, while studying any sociological problem, we must base our thoughts on geographical knowledge.

Geographical factors, so far as they agree or limit contacts, have sociological interest and significance. They are not interactions, but are preconditions of our interactions. The sociologist is engaged in the study of human action in its effects, in developing personality types and culture forms. Geographical conditions and natural resources are basic factors in determining the mode of life, viz., hunting, fishing, agriculture, division of labour, the kind of co-operation, the form of social organisations (Social morphology), etc. The external physical environment has great significance in creating and conditioning the phenomena which Sociology studies, but its investigations lie outside of sociologist's field of study.

Geography and Economics. The relation of economics with geography is very close. The environment set-up of a country plays an important part in its economic development. Given the physical features and characteristics of any country, and the character of its population, it is not very difficult to form an approximately correct idea of the economic conditions of the country. The climate of a region plays an important part in the formation of health and vigour of the people inhabiting it, and in conjunction with the characteristics of the soil, determines its flora and fauna. All these factors play an important part in the economic development of every country. Why India is mainly an agricultural country is in no small measure due to physical characteristics. It is impossible to acquire a sound knowledge of her economic position and conditions without an intimate knowledge of the geographic feature. Geography deals with man's environment as affecting his activity and well-being; and so far as geographical surroundings influence man's economic activities—and they do so in a large measure—a student of Economics has to study Geography.

Geography and Politics. Aristotle was one of the earliest writers to give attention to the influence of geography upon the political institutions and the national character of the people. Ratzel's *Political Geography* (1897) put forward the thesis that the State is a living organism requiring an ever-expanding *labensraum* (living space) in order vigorously to survive. Among the modern writers Bodin in the sixteenth century, gave his close attention to the study and opined that the interrelations between the States are greatly influenced by the geographical

conditions. Each geographical factor of spatial extent of the country, the physiography, lay-out, natural resources and the fertility of her land, racial composition of her population and her position in respect to the adjoining oceans and lands tend to influence her political frameworks, nature of government and her diplomatic attitude towards her neighbouring countries. Absence of strong physical boundaries in the Belgium plain had a significant effect on her diplomatic relations with Germany and decided her fate in the two World Wars. While the complete insularity limited productive lands, dire want of foodstuffs, a vast reserve of iron and coal and a pressing burden of population, induced Great Britain to expand beyond the seas with an imperialist policy. Japan's foreign policy is in harmony with the geographical environment. Thus in framing the national policies and in determining the character of political institutions Politics is greatly influenced by Geography.

Geography and Anthropology. (Anthropology is a science that investigates the position of mankind zoologically, studying its history, physiology, psychology and their mutual bearings. It studies customs of primitive man, myths, religious beliefs, the life of hunting man, nomads, the clans, tribes and genes, etc. Thus it is a science of man in relation to his physical characteristics, (i.e., *Physical Anthropology*).)

People living in different parts of the world are by no means alike. They differ from one another in their physical characteristics, mental capacities, in dress, occupation and language, etc. These differences are due to long, slow and silent but continuous influence of geographical environment. Though races are independent of environment yet they cannot escape altogether the environmental influence, e.g. Temperate Zone's people are fair; Tropical Zone is a home of yellow people; Sub-tropical Zone's people are relatively dark while Equatorial people are on the whole darkest. This progressively dark shade, as we proceed from Pole to Equator, gives the indication of some relationship between temperature and skin colours.

[*Geography and History.* Although there is an essential contrast between History and Geography because the former deals with the growth of institutions and states and has reference to life and work of individuals of special importance and excellence. Geography, on the other hand, deals with the growth of units within the states and tends to show that similar units in different states arise under similar condition. Yet both these branches of knowledge have much in common. In both these occur the elements of time and space. In history we study the development of political systems in different countries through different periods; geography studies the spatial development of

the known world and studies the chronological sequences also in order to explain some geographical conditions.

"Geography is", as has been well said, "the foundation of all historical knowledge". The history of India, like that of other lands, cannot be understood unless regard is paid to the physical features of the stage on which the long drama of her history has been played, and before we attempt a rapid survey of the actor's deed we must pause to consider the manner in which the position and structure of India have affected human action.

The leading fact about India as affecting history is the obvious physical isolation. India is bound up by mountains on three sides, north, north-east and north-west and by the great ocean in the south. This very fact, in the ancient times, when the sea was not commanded, made the country a closed shell, the only way out were the land gates in north-western frontier, which dominated the whole history for thousands of years.

Still to-day due to the physical barriers, it has least relations with its neighbours, i.e., Tibet, Burma, Afghanistan, Persia, China, etc., while it is closely bound up with the remote island of Great Britain due to the ocean routes.

India lacks certain important minerals, therefore, it is not fully developed industrially. But its climate is most suitable for agricultural operations. Hence, from times immemorial India has been a great agricultural country.

Statistics and Geography. Statistics is closely related to geography. Without statistics geographical facts cannot be represented. Statistics at best is a part of geography. P. Vidal Blache says, "In trying to show a country in different aspects I have had to borrow from sciences not for the sake of focussing attention in different subjects but in order to draw from them useful proofs. I have not tried to elucidate the science of statistics, but rather to develop geography by means of statistics."

Place of Human Geography among Social Sciences. Human facts and natural phenomena cannot be separated and, hence, its relation with almost all branches of sciences exists in one way or the other. But man's relation to his environment are so numerous and complex that they constitute an object of special study. The investigation which they receive in Anthropology, Sociology, Politics, Economics and History is piecemeal and partial, limited to race, cultural development, state, or economic incentives, etc. The geographical factor is not thoroughly analyzed which enters into the problems of those different branches of study of this science.

When geography is considered as the study of the relationship between man and his natural environment, the character of the science is completely changed. No longer is it a static, lifeless form; now it may function as a dynamic and constructive power. It opens many a door for analysis, scientific research and for synthesis, a necessary element in modern education.

It then discharges a duty performed by not other sciences—physical or social; it possesses “a unity and a point of view unique among the sciences which deal with humanity”. As a matter of fact, this relationship concept is the only justification for geography’s existence; it is the only quality which the subject retains which has not already been acquired by other fields.

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CHAPTER 2

HUMAN GEOGRAPHY—ITS ORIGIN AND GROWTH

The influence of natural environment on human activities and human mental and physical traits has been the subject of speculation throughout the ages, from the Greek philosophers onwards. Of the early moderns who were tempted by the problems mention may be made of the French Jean Bodin, who in the 16th century endeavoured to mark out on the surface of the earth the great forms in which human societies were inserted. He had a clear idea of the insufficiency and arbitrariness of a rigorous geographical determinism, for he made allowance for the exercise of human and divine will. A century later Abbe Dubois wrote on the relations of distribution and genius and ability in the arts and sciences, to physiological effects of climatic conditions. Buffon's conception (1861) of the mutual relations of man and his environment shows a marked improvement, greater precision and better understanding of the forces at work in those interrelations than his predecessors. "For some thirty centuries the power of man has been joined to that of nature and has extended over the greater part of the earth. By his intelligence the animals have been tamed, by his labours marshes have been drained, rivers embanked and provided with locks, forests cleared, moorlands cultivated... The entire face of the earth bears today the imprint of man's power, which although subordinate to that of nature, has often done more than she, or at least, has so marvellously seconded her, that it is by our aid that she has developed to her full extent."

Henry Buckle stressed the influence exercised by physical laws over the organisation of society and over the characters of individuals. He attributed individual and national character to the effects of physical conditions. Regions of great mountains or extensive plains (as in India) produce in man an overwrought imagination and gross superstition. When natural features are smaller and varied as in Greece, reason develops in man at an early stage. Climate, he argues, not only stimulates or debilitates but also affects the constancy of man's work and his capacity for it. He considers that "no people living in a very northern latitude have ever possessed that sturdy and unflinching industry for which the inhabitants of temperate regions are remarkable." The reason, he asserts, is that the climate prohibits out-of-door employment for much of the year resulting in desultory habits of work and fickleness of national character. This type of national character he notes in Norway, where the interruption in labour activities is due to severe winter, and in Spain, where it is due to the heat and drought of the summer.

Both Humboldt and Ritter accepted the essential interdependence of man's activities and physical conditions and both offered to their successors ideas which directed the lines of development of a modern geography. (While Humboldt was definitely a physical geographer, Ritter set out to elaborate the human aspect of geography, with special reference to the influence of physical conditions of the history of mankind.) He offered broad and fundamental concepts about man and nature and regarded geography as '*merely the hand-maid of history*'.

After the death of the two pioneers a great reaction followed. (Paschel opposed Ritter's views and considered geography only as the study of the earth surface features, man's activities lay beyond its scope. Thus 'dualism' of geography—physical and human was established.) Afterwards the bridging of the gap between this dualism of geography was effected (in the latter half of the 19th century) by two schools of thought, headed by Friedrich Ratzel in Germany and Frederic Laplay in France.

During the same period the theory of organic evolution was established and popularised by Darwin in his *Origin of Species*. In the flood of thought, it was but natural to assert that the relations of man and nature with adaptation to environment should be determined by thorough natural selection as other organic lives are determined.

(The influence of these new thoughts arising from the theory of organic evolution is evident through Ratzel's work. Interpreting Ratzel's views Miss Semple writes, "Man like plants and animals, is a product of his environment and his activities, development and aspirations are ruthlessly conditioned by it. Man is a product of the earth's surface.) This means not merely that he is a child of the earth, dust of her dust; but that the earth has mothered him, fed him, set him task, directed his thoughts, confronted him with difficulties that have strengthened his body and sharpened his wits, given him problems of navigation or irrigation and at the same time whispered hints for their solution."

Regarding man as essentially passive, Ratzel sets out to establish the laws of the physical environment which determine human activities—distribution and organisation—in both space and time. But it must be admitted that in laying the foundations of a new science, the influence of one factor—the environment—will necessarily be apparently over-estimated. For both writers are aware of the complexities of their problem, of the rashness of broad generalization, and the importance of psychological factors, 'easy to assert but difficult to prove'

(Geographical influences on men are divided into four groups: (i) direct physiological effects, (ii) psychological, the

geographical conditions which influence the economic and social development of people by abundance, paucity or general absence of natural resources, (iii) the influence of factors in directing the movements and (iv) the ultimate distribution of mankind. Man and the State are entirely dependent upon them; no credit is given to human will and initiative; all is pre-determined) and the soul is dominant. "She has entered into his (man's) bone and tissue, into his mind and soul"; and "always the same, and always situated at the same point in space (the soil) serves as a fixed support to the changing aspirations of men". It is this says Ratzel, "which governs the destinies of people with blind brutality and people should live on the land fate has given them; they should die there, submitting to the law."

Again he believed that, "Society is the medium through which the State becomes attached to the soil" and hence, (the relations of society and the soil affect the State at every stage of development. We are then speedily led to the conclusions as follows: "The larger the amount of territory necessary for the support of a given number of people, . . . the lesser is the connection between land and people, and lower the type of social organisation." Every advance to a higher state of civilisation has meant a progressive decrease in the amount of land necessary for the support of the individuals.)

Ratzel regarded the State as an organism in constant motion, expanding in area till reaching natural limits, provided the effective opposition is not offered by strong neighbours, overflowing those limits. "Geographical and still more political expansion," according to Ratzel, "have all the characteristics of a body in motion which expands and contracts alternately in regression and progression. The object of this movement is always the conquest of space with a view to foundation of the states, whether by nomad shepherds or by sedentary agriculturists. (Human groups and societies always develop within the limits of a natural framework, towards which from a small nucleus they expand and probably overreach; always occupy a definite location in the globe; and are always in need of sustenance.) Hence, their inevitable association with a definite area which, with the increase of population, will inevitably expand, until met by natural or human obstacles."

(As regards area Semple writes, "A struggle for existence means a struggle for space", and hence the constant tendency for states to expand from a small to a larger area. Thus, "We may lay down the rule that change in real relations both of the individual to his decreasing quota of the earth's surface is an important index of the social and political evolution. Therefore, rise and decline of peoples and civilizations have depended on

their relation to area. Therefore, problems of area..... dominate all history.")

(The wide area found by Darwin to be most favourable to improved variation and rapid evolution in animals, operates in the same way in human development, and its influence becomes a law of Anthro-geo-geography. As in other organic life, a larger area guarantees racial and national permanence, small area weakness and impermanence. In the process of state expansion, "gradation in area marks gradation in development." Moreover, the higher the scale of civilisation of a community, the greater the density of its population, is an axiom which is substantiated by a scheme of densities for different modes of life, from the industrial agglomerations, to hunters and pastoral nomads.) Thus are expounded laws of the territorial groups of peoples and of states.

Frontiers are essentially transitional zones. Political frontiers are subject to constant fluctuations due to the expansion and contraction of the state. Border communities, owing to their peripheral location, are liable to unrest and a desire for political autonomy.

In this Anthro-geo-geography Ratzel has three main objectives:

1. The mode of human distribution and groupings, ethnic, national, linguistic and religious, etc.
2. The interpretation of these distributions as determined by the physical environment.
3. The direct effects of environment on individuals and thus on society.

In the first volume of his book (1882) he treats the causes of human distribution, i.e., dynamic aspect of geography and in the second volume, facts of distribution, i.e., the static aspect of geography.

(Ratzel defines the limits of the habitable land and the uninhabitable lands within it, and he studies and attempts to account for the oscillations of their frontiers. On the edges of the habitable world are the border peoples, the outposts of civilization: *Eskimos* in the north; *Hottentots* and *Bushmen* in the South.) The tapering of the southern continents results in greater ethnic variations than in the northern hemisphere.

(Migrations with the habitable lands are discussed in their relation to natural routes and barriers.) The facts which govern man's distribution and development are treated. (Climate determines the location of the chief centres of civilization in the temperate belt. Mountains function as frontiers and place of

refuge, though rarely are they absolute barriers. Water bodies are one of the greatest obstacles to the primitive man, and highways of intercourse when the art of navigation is mastered. Here follows an analysis of the human geography of coastlines. Rivers and marshes prevent expansion, and the latter serve as places of refuge. Forests function similarly.

Semple like Ratzel deals with the human geography of the main types of environment) and adopts in the book the same determinist attitude, with sweeping generalizations based on slender evidence.

(In Ratzel's *Anthropo-geography*, "the whole life of man, all their multiple activities, human groups and human societies are studied methodically, rationally and collectively in relation to their geographical environment," with the object of restoring to geography "the human element," the claims of which seem to have been forgotten and to reconstitute the unity of geographical science on a basis of nature and life. Such is the summary of the plan of Ratzel's work." (La Blache) He raised human geography to the dignity of a science—albeit his method was too rigidly scientific—which has since been critically examined in its scope, its method refined and its outlook modified. Raveneau, another great geographer sums up, "Between physical geography, sometimes predominant or exclusive, and the science of man, which neglects so easily the framework in which man moves and the space in which he lives, Ratzel has taken his stand. He has strongly insisted on the necessity for a broad view of general conditions, and grand laws on which depend the distribution of man over the earth. His principal merit is that he has re-integrated into geography the human element. By that he has given that science a new orientation and stimulus."

Fredric Laplay (1806-82) made detailed observations of social and economic conditions, and established a new method in Sociology. He made two important contributions to Sociology: first, his insistence on the treatment of the primary occupations and secondly, the elaboration of his formula, 'Place, Work, Folk'. The primary occupations include such activities as hunting, herding, mining, fishing, etc., The type of environment in rural areas (place) must be related to the type of work, while upon the type of work largely depends the social organisation and outlook of the folk.

The principal disciples of Laplay in France were Henri de Fourville and Edmond Demoulius. These two writers dealt with the social life of typical communities and claimed their organisation and activities to be definitely determined by their natural environments. Demoulius dogmatically declares, "The primary and decisive cause of the diversity of people and races is the route which they have followed. It is the route which creates

both the race and the social type." But he goes further than this, for "if the history of man began again, without any changes on the earth's surface, it would repeat itself in its main features."

(Ratzel's human geography met with protest and criticism on account of its materialistic basis and the wide scope encroaching on the social sciences, which he claimed for it. (The new school of French Sociologists were up in arms.) Durkheim, in a review of *Anthropo-geography*, complains of its indeterminate object and method. "It amounts, in short to studying all the influences exerted by the environment on social life in general." These facts he argues, are too diverse to be included in one science; a single person cannot possibly master all the problems which they raise. ("Ratzel", continues Durkheim, "overemphasises environment at the expense of contributory social factors, which modify the human response.")

(The anthropologists also were in opposition. Ratzel glibly ascribes physical and mental traits to the influence of environment, and dogmatically discusses problems which are still unsolved by psychologists and anthropologists, notably the respective parts played by environment and race, in human, mental and physical make-up. "The full meaning of life", writes Marett, "can never be expressed in terms of its material conditions". The schools of Ratzel and Laplay, he continues, are fertile in generalisations that are "for too pretty to be true". (Man cannot be regarded as puppet in the hands of nature. He is a rational being, with a social heritage, and his actions are not directly prompted by his surroundings.) Otherwise, says Marret, "Why do man herd cattle, instead of the cattle herding the men?"

(The modern concept of Human Geography, which has been labelled as "Possibilism", as opposed to the Ratzellian Determinism, had its most brilliant exponents in Vidal de la Blache, who died in 1918, and Jean Brunhes, who died in 1930. His main aim in geography was to study the cause and effect in related phenomena, and then to co-ordinate and establish general principles through the comparative study of different parts of the globe, on the lines suggested by Humboldt and Ritter.)

(The modern concept shifts the centre of gravity from nature to man—the active agent. His mode of life is the product, not of the dictates of environment, but of a complex of factors, social, historical and psychological.) As La Blache has pointed out, "force of habit plays a great part in the social nature of man", and according to the social complex, so, with similar environments, may be associated different modes of life. (The environment contains a number of possibilities and their utilization is dependent entirely on human selection. A social com-

plex, engrained through habit, may, therefore, result in the neglect of certain possibilities.) In short, "the outstanding psychological fact, then, is the antithesis of a rigid fatalistic determination of human acts by climatic and social factors. It is this—that natural surroundings whether as a whole or in detail, react on us just so far, and just in such a way, as we adopt them: in other words, according to our interpretation of them." The man is there, the flint is there, but it is the man who makes the spark fly, "all the essential facts begin and end in facts of Psychology."

Fluere, to whom the label 'Possibilism' is due, again clearly states the attitude, "It is not true that four or five geographic influences weigh on historic bodies with a rigid and uniform influence but at every instant and in all phases of their existence, through the exceedingly supple and persistent mediation of those living beings enforced with initiative, called men, isolated or in groups, there are constant, durable, manifold, and at times contradictory influences exercised by all those forces of soil, climate, vegetation—and environment." He continues, as a byword for modern geographic method, "there are no necessities, but everywhere possibilities, and man, as master of the possibilities is the judge of their use." This, by the reversal which it involves, puts man in the first place—man, and no longer the earth, nor the influence of climate, nor determinant condition of localities.

Jean Brunhes, the most brilliant disciple of Vidal de la Blache worked on the basis of his philosophy and summarised the fundamentals of latter as follows: "In recalling the concrete idea of the physiognomy of the earth as modified by man, in perceiving not only an intervention of man in the equilibrium of inorganic nature but also that class of relations which places men at odds and in competition with the other living beings, in studying the human facts only in their relation with the surface from which there develop these multiple actions, incessantly repeated, in utilising the method of the biological sciences, in using, likewise perfected instruments for his work (exact maps, results of exploration, verification of data), in taking account, as a starting point, of the general facts of distribution, and in arriving at a sort of "ecology" or connection of the complex bonds existing between a country and its inhabitants, without neglecting the influences from elsewhere—in all these points this doctrine is characterised."

(Professor P.M. Roxby summarised the modern concept of Human Geography) in his presidential address to the Geography Section of the British Association (in 1930. In his view it consists of "(a) the adjustment of human groups to their physical environment, including the analysis of their regional experience,

and of (b) inter-regional relations as conditioned by the several adjustments and geographical orientation of the groups living in the respective regions.") The term "adjustment" I take to cover not only the "control" which the physical environment exerts on their activities, but the use which they make and can make of it. (Human geography is the study of an interaction rather than of a control.) The adjustment has distinct but usually closely related aspects which form the main branches of human geography.

(The four principal aspects of human geography are racial, social, economic and political. The first treats the distribution of racial types, and their mental and physical traits, relatively to the environments in which they are found and in so far as they affect the human response in different environments. The Social Geography is defined as "the analysis of the regional distribution and interrelation of different forms of social organisations arising out of particular modes of life". While economic geography includes the geography of production and consumption, exchange and transport, the function of Political Geography is to study and appraise the significance of political and administrative units in relation to all the major geographical groups, which affect mankind. Finally, "historical geography is essentially human geography in its evolutionary aspects.")

(Barrows,) in an article borrows a botanical term and (calls geography "*the science of human ecology*", the aim of which is not to examine the character and occurrence of features of environment, but to examine human responses to them. Man is the central theme, and all other phenomena are interpreted only in so far as they are related to man's adjustment to them.)

(But this concept of human geography has, however, been subjected to criticism in recent years) by a number of geographers. According to the criticism of Carl O'Sauer, on the basis of scientific method, "Geography is primarily concerned with the description and interpretation of earth's features, physical and cultural. It aims at describing systematically the physical and cultural landscapes, and to interpret these in relation to all contributory factors, whether they be environmental or not. (It is not, on this view, concerned with the investigation of human adjustment to the environment, but with the description and interpretation of real occupance.)

Thus each of the branches of human geography is of recent growth and its development is intimately associated with that of the cognate sciences concerned in each case.

CHAPTER 3

MAN AND ENVIRONMENT

(The earth is the stage for human drama. The stage is as important as the drama because it provides a setting. Our ancestors have given us a certain setting or environment in which they adjusted themselves.) Historical times are not sufficiently long to trace out the details and degree to which man has adapted himself to a certain physical setting. (Man has influenced the living world for a longer period. The environment is another name for physical limitations. The influence of environment can be thus seen in the efforts of man to establish himself while solving the local problems of his immediate surroundings. The environment determined his physical needs of hunger, clothing and shelter from rain, heat or cold. Not only that, it also influenced his thoughts, religion and culture.) The god of a dweller in the tropical warm region lives at some cool place whereas that of an Eskimo of Tundra is definitely at a warmer place.

(But it is not the efforts of a particular individual but those of groups of human race which can explain the environmental effects.) An isolated object means very little, and it is the common stamp or collective impression which allows to draw certain conclusions. (Civilization means accumulated experience of a certain group, whereas culture is the abstract idea influencing those groups in their attitude towards life and living. Modern life has become very complex. Therefore, the environmental effects may be better observed in some primitive communities where the outside influences have been minimum. In such groups can be noticed a higher degree of adaptation having their locally made implements, weapons, clothings and industries. The efforts and progress made by man in fashioning tools, inventing method of making fire and rudimentary industries started by him in pre-historic times are important since the man of today has based his progress on the experiences of the past.

The physical aspect of environment is very important since it influences our body, settlement patterns, occupations and way of life. It is the physical environment which determines the fulfilment of basic needs of man—vegetation, clothing, consistent with the atmospheric effect, shelter, basic occupations, etc. Actually the physical potentialities of a certain area or region are reflected in the density of population it maintains. The movements of population in historic and pre-historic times were based on the physical possibilities of the region to quench hunger with minimum physical exertion. The groups of people concentrated firstly in areas of greater potentialities and it was only later on that regions of lesser possibilities were occupied.) The

political events in historic and pre-historic times do not allow us to draw clear-cut conclusions in this respect.

[The mode of living in a certain region is the product of environment and not merely an accident. It is also not very essential that in similar areas of the world, there should be similar development which depends so much on the extent to which the resources of the region have been utilised. The extraction and utilization of resources further depend upon the progress and intellect of the society as well as social order.]

Environment can be physical and non-physical. Human geography is very much concerned with the physical environment because it affects human activity to a greater extent. The basic occupations of human race are so closely related with the physical surroundings. Man is so much absorbed in the physical environment that he becomes a part of it, asserting, adjusting and modifying his physical horizon according to the capabilities of his racial group. The physical environment includes a country or region's location, topography or land forms, climate, social, vegetation, animals, minerals or natural resources, coastline and rivers.)

✓ Location. Our globe is not one unit so far as environmental effect is concerned. (One important factor responsible for this diversity is geographical location of regions. Location determines and affects the potentialities of the region whereas the surrounding areas improve human contacts and ultimately leave an impact on historical events and economic development. It is geographical location which can ultimately explain the limitations of historical events. Great Britain has an ideal geographical location since it was so near the industrially advanced Europe and yet not a part of it. The growth of industries and ideas of Europe very much influenced Great Britain, yet political events in Europe could not affect the normal set-up and frontiers of the country as it happened in the case of Germany, Poland or France.)

(Latitude is a very important factor in location. Most of the coal and iron ore deposits of the world are located in the temperate regions. The climate is invigorating and equable as compared with hot humid tropics and very cold polar regions. The vegetation is so closely related with climate, agriculture and even minerals like coal.) In the words of Miss Semple, "Location means climate and plant life at one end of the scale, civilization and political status at the other."

So far as the location of a certain region in relation to surrounding areas or countries is concerned, it does have its due influence. (All the countries of western Europe developed their industries because of closer relationship with each other and

accessibility. The Allies won the Second World War because of the locational advantage of Russia and U.S.A.) Japan won nearly the whole of south-east Asia but found it impossible to maintain her stay due to absence of strongholds on the mainland of Asia. (It was realized then that it is not the location in relation to sea which is all-important. When a country is located far from the active world it loses its significance. Alaska, Greenland and Northern Siberia are its examples.)

The importance of location in relation to the surrounding countries has already been explained. But geographic location is a relative concept. It explains the relationship of a country in a specific area which is important industrially with well developed means of transport of international significance. Yet even in most of the cases it is not true. The Atlas countries were so near Europe yet they remained under-developed. Secondly the approaches to various regions and countries may change caused by the changes in economic and political structure of the areas. Great Britain has all along remained the political and trade centre of the world but now the areas nearer Russia and U.S.A. are gaining importance. Mackinder realized the locational importance of Russia as far back as 1904 and called it the 'heart land' of the 'world Island'. The commanding position of Russia in relation to eastern Europe, Central Asia and West Asia is noteworthy. It is only in the present-day political events that the importance of approaches by land has been realized and those established ideas valuing only the sea approaches have been partially shattered. (The importance of India as regards her locational value in South Asia has been established as she enjoys a central position commanding sea approaches in the Indian Ocean and that her political and economic importance is fast increasing.)

From the discussion followed in the previous lines, (it is possible to) draw certain conclusions and (classify the locational types of various countries of the world.

(i) *Central Location.* Such regions do not have sea approach and therefore develop a continental outlook. Yet their importance as regards their commanding position in a certain area cannot be minimised. The examples of such areas are Afghanistan, Switzerland and Yugoslavia.)

((ii) *Peripheral Location.*) It actually means the boundary line especially of a round surface. It means to describe those areas which are on the margins of the continents or well developed regions. (Areas located on the edges of the continents having good transport links with the interior as well as by sea enjoy the benefits of the continent as well as sea approach. The deve-

lopment of resources is easily possible. The examples of such areas are most of the countries of West Asia or Egypt.)

(iii) (*Scattered Location*. Some of the political units are not geographically compact areas. Such examples are New Arab Union, the Portuguese settlements of India and Pakistan which is divided into eastern and western wings.)

(iv) (*Location in related series*. In political units such good example can be Indonesia which is an archipelago of about 5000 islands located in a compact unit. In economic field such regions may be noticed in the form of oases in the deserts. Those are independent economic units though placed in series.)

(*Water Bodies*. Nearly 71% of the globe is covered with water. Such large proportion naturally has its own importance. Water bodies have their economic value because of the resources they contain in themselves and due to transport facilities they provide. The water bodies separate the continents. This separation by sea was responsible for decreasing easy intercourse and exchange of ideas between various parts of the globe. A different civilization, culture and occupations developed in various parts uninfluenced by each other.

There is other side of the picture also. The water bodies or the oceans provide the easiest means of contact. The Buddhist ideas easily crossed the Indian Ocean and spread over the whole of south-east and east Asia. The European civilization spread over the Americas and Asia utilizing the Atlantic or Indian Ocean as the easy method of transport. It was the breaking of the seas as a barrier which has influenced the world history right from the 9th century. The sea is responsible for bringing together various cultures of the world to a greater extent.

The oceans influence human activity, civilization and culture to a very great extent. The location of a region in relation to a water body determines its political and economic growth. On its cultural side the oceans develop a marine outlook. This earth looks wider. The capacity to impart knowledge and assimilation of ideas increases. The world has been dominated by island nations of nations with marine outlook throughout the last five centuries. (The location in relation to sea can be of the following types—Continental, littoral, insular and peninsular. Soviet Union, Hungary, Yugoslavia and Afghanistan are the examples of continental countries. Such areas cannot develop marine occupations or trade.) Inaccessibility by every other country through the ocean is not possible. (France, Egypt and Spain are very good examples of littoral location because these countries are on the margins of the continent enjoying continental links as well as controlling the most important ocean routes of the world. Italy and India have a major portion of

them jutting into the ocean. This is most important from the point of view of climate, trade and exploitation of sea wealth. This peninsular location is thus a valuable asset. The island countries are important provided they are of considerable size, have resources and manpower and are not far away from the continents. Great Britain and Japan are the examples of such regions.)

(From the point of view of trade and political stability the control of ocean waters is essential. From 15th to 19th century whosoever controlled the sea controlled the continents and benefited from the trade and the resources.) Though in the 20th century political consciousness has awakened all the continents, its importance in trade cannot be ignored. The ocean frontiers provide natural boundaries and help in political stability. There is incentive because one can look beyond one's land. (The proximity to ocean makes climate moderate and stimulates working capacity.)

The ocean provoked man's efforts and courage. He must have seen logs and wood floating over the water. This caught his imagination and he invented canoes and boats. The type of boats improved with the passage of time and experience. The ocean barrier was broken. It was navigation as an art and occupation which gave furtherance by increasing the complexity of human life, ideas and occupations like transport, realization of customs and trade. The growth of navigation as a human occupation is remarkable. In the words of Miss Semple, "The problem and task of navigation is the most widespread and persistent in the history of mankind". It was on the basis of navigation that deep sea and coastal fishing grew as an important occupation.

(The oceans have their economic value as they supply salt, fish, pearls, corals, potash and carbolic material. In areas of a drier climate like Kathiawar it is a very important means of livelihood. In Japan the fish provides 1/6 of the total food of the country. Areas in the temperate zone especially in the north form the most important fishing grounds of the world. Japan, U.K. Norway, Canada and New Zealand are the most important countries who have developed deep sea fishing.) In Norway the intensity of this occupation increases along the coast line towards the north. Like Japan the whole coastline is dotted with tiny villages of fishermen. So important is this occupation in the economy of Norway that there is a saying "Amsterdam was built on herrings". The fishing industry was indirectly responsible for the growth of merchant marine of Japan which became the second biggest sea power in the world before the second World War.

(*Rivers and Lakes.* Rivers are the life-lines of agriculture and transport especially in a country with seasonal or inadequate rainfall. Rivers have played a very important part in the progress of civilisation. The oldest civilizations of the world developed in the river valleys because of favourable geographical conditions. The valleys of the Hwang-Yangtze, Indus, Ganges, Tigris, Euphrates and Nile are known as cradles of civilization. The growth of civilization started with the development of agriculture and increased with manufacturing and distribution of commodities. The rivers provided the natural transport routes and the most important towns and industrial centres of the world grew up on the banks of the rivers. This is mainly due to transport facilities provided by the rivers in the plains traversed by them. The value of rivers is enhanced if they are ice free, have a perennial flow, there are few floods and they connect the areas of high density of population with agricultural industrial or commercial activity. The rivers of northern Russia and Canada are not of much value from this point of view. On the other hand the rivers of western Europe and northern India flow through economically rich plains providing navigation and irrigation facilities and enriching the whole region. The rivers also form natural frontiers between various countries.)

(The rivers increase the fertility of the region through which they pass by depositing the sediments brought by them. The fabulous fertility of the yellow Yangtze, Tigris-Euphrates, Indo-Gangetic plain and the Nile valley is all gift of the rivers. Egypt would have been a desert without Nile.) The river has provided irrigation facilities to the region changing the entire dry and sandy landscape. The fertility of Gangetic and Yangtze delta is reflected in the bumper crops grown in that region. (The value of rivers is being enhanced by the multipurpose river projects undertaken in India which aim at utilizing the river waters for irrigation, navigation and generation of hydro-electricity. The dams are being constructed across the rivers for storing water and taming the rivers for flood control.) The excess water in the rivers which once hampered the agricultural activities of man besides destroying the settlements, is now at the service of man. The river waters are thus replacing a very important mineral—coal. The work of man has changed the seasonal Damodar river into a perennial one. (A glance on the population map of India will reflect humming activity of man around the rivers.)

The rivers are responsible for bringing into existence the plain on the face of the earth which are the main centres of human activity. The rivers have formed the plain both by erosion and deposition. Thus they provided the main agricultural regions. Even in hilly regions they provide the foremost human need, i.e., drinking water besides irrigation facilities for agriculture.

(The lakes are sometimes the sources of the rivers. They attracted settlements. The lake-dwellers of Kashmir treat them as their homes. The whole activity is centred around it. Saltish lakes like Sambhar in Rajasthan are a very important source of salt. The lakes also provide fishing activity.)

Topography. Topography is the immediate environment of man with which he identifies himself. Land forms reflect the economic and cultural stature of a country. The topographic unit of a vast area is a sign of economic and political greatness of a country.) The topographic study is very much essential for a correct approach to human geography since it provides a background or stage for environmental analysis of the human activities. (There is also physical and economic inter-dependence of the mountains, plateaus and plains.)

(The mountains restrict human activities. Meagre and scattered resources are responsible for tiny, scattered settlements in hilly regions. Greater slopes, high rate of erosion and difficulties of easy human contact restrict human activities and ultimately density of population. Mountains impose handicaps on the movement of people, ideas and goods and thus check the growth of transport trade and human institutions.) Even in a continuous and compact mountainous region, there are secluded and far off located settlements joined only by a thin line of contact.

The study of human occupations and settlements is very interesting for a student of human geography because man is in direct conflict with his environment. The means at his disposal are meagre yet he may be seen struggling with his immediate local problems of terracing, bringing water for drinking and irrigation by means of kuhlus or small channels from far off distances and constructing houses with the help of local material. (Thus the influence which mountains exert on man and his activities is one of the most positive of geographical forces. From the point of view of modern civilization they are unprogressive but living in direct contact with nature, they are sturdy, energetic and brave. These people are generally honest and stick to old customs and traditions.) The development of transport is fast removing this isolation and they are coming into a closer contact with the outside world.

(In the mountainous region its altitude plays a very important role in determining human settlements and occupations. In the one and same mountainous range the human occupation will be different in higher and lower slopes. In lower regions bordering the plains there will be greater intensity of agriculture whereas towards higher altitudes it may be forestry or sheep and cattle rearing with scattered and seasonable tiny settlements.)

In most of the lower areas agriculture is the main activity. There being dearth of flat areas, the agricultural land is converted into small terraces. There is thin layer of soil which too is sometimes washed away by heavy rains. The terraces help in checking the soil erosion to some extent. The resources to provide manures are few and use of machinery is not possible. The yields are very much lower as compared with the plains. Of course there are some crops which suit only in such areas, e.g., tea. Terrace cultivation is widespread in the hilly regions of southern Europe, Atlasland of Africa, throughout the lower Himalayas in India and Burma and in almost all the hilly areas of China and Japan.

(Food supply controls the distribution of population in hilly region. This simple principle does not seem to be applicable when minerals are available in certain region or there is political and administrative importance like that of Simla.) In hilly areas of Brazil and Union of South Africa, there is greater concentration of population because the climate is more suitable for the white settlers as compared with the warm moist or damp lowlands. Even in the same region the density of population differs in predominantly agricultural or pastoral regions. Pastoral products like wool, milk, hides and skins, forest products like timbers, resin, turpentine and lac, minerals wherever these are available and soils are the raw materials for human occupations in the mountainous regions. Some small-scale occupations like carpet manufacturing, wood work, lumbering and sheep rearing are predominant. These occupations also differ with seasons. The Kashmiris come down to the plains in intense winter to work as labourers whereas in summer they go back to their homes to work on their terraced fields. The Gaddies living on the ranges of Dhauladhars move down in winter along with their flocks whereas in summer they move up to the high pastures again and reach right near the snow-line. In very cold areas of Spiti and Lahaul touching the borders of Tibet, there is heavy snowfall during winter and people cannot move out at all. There is very little or no work during winter.

(The growth of tiny settlements and dearth of concentrated market prohibits specialization in human occupations. It is difficult for a person engaged in a single occupation to have sufficient business. This leads to complexity of trades being carried on by one and the same man. A carpenter may also be a blacksmith, a weaver, a mason, a school teacher may hold the additional charge of a postmaster and all may carry on a little farming also.

The mountains are of great benefit in many ways. The climate of India would have been different without Himalayas. The cold winds of Central Asia are not allowed to enter the northern plains of India. These plains are therefore 3-5°F

warmer than corresponding latitudes in the world. The rain-bearing monsoons are kept within the Indian realm by this mighty wall of the mountains. These mountains provide a natural frontier between Burma and India as also between India and Tibet. The Alps, Carpathians and Pyrenees of Europe also make excellent natural frontiers.

(The mountains afford pasture grounds and provide livelihood to a large population of herdsmen.) On these are situated forest resources of various countries which provide basic occupations like lumbering and transport as well as raw material for various manufacturing industries like match boxes, paper, tanning and dyeing of leather and sports goods. (The mountains also contain very important sources of various minerals. The examples may be oil in India, copper in Bolivia and gold in the Union of South Africa.)

(The mountains are the sources of the most important rivers of the world. All the important rivers of northern India like Ganga, Jumna, Brahmaputra and Sutlej have their sources in the snow covered Himalayas. Some of the important rivers of Europe like Rhine, Rhone, Irin and Po have their origin in the mountains. Besides providing irrigation and drinking water, most of these rivers form rapids and waterfalls which are utilized for generation of hydro-electricity. Japan, Norway, Sweden, Switzerland present very good examples as to how development of hydro-electricity has helped in the industrial development and transport system of these countries.)

(In the tropics, the mountains provide very good sites for health resorts. Such examples may be the hill stations of Simla, Nainital, Darjeeling and Ootacamand.) In the equatorial regions of Africa, the white settlers have chosen to stay in the hilly areas to escape from the warmth and high rate of humidity. The scenery of Kashmir, sulphur lakes of New Zealand, high lakes of Southern Chile and Switzerland attract a very large number of holiday makers.

(The plains are first to be occupied by the people as long as space is available. It is interesting to note that whereas the plains occupy merely one-half of the earth's surface, they maintain more than 90% of the world population. The economic possibilities like agriculture are greater and the means of transport easier. All areas below 600 feet height can be included in this category and the only physical obstacle is in the shape of rivers and lakes. The plains formed by the rivers are fertile and therefore very suitable for agriculture, transport and trade.)

The early civilizations based on agriculture developed in these river valleys and even today these areas maintain the

highest density of population in the world. The growth of all the important cities of the world is confined to the plains.

Even in historical times most of the political institutions and movements had their origin in the plains. The expansion of political domination was confined to the plains. The Indus valley and the Gangetic plain have seen the growth and decline of various kingdoms whereas the tiny hilly states remained untouched by foreign invaders sometimes for centuries together. The expansion of Soviet Russia in Central Asia reflects the topographical similarity giving a regional compactness. In Australia the growth of population was first of all round the Botany Bay which later on crossed the Australian Alps and there was again expansion in the Murray-Darling plains.

(In the arid plains, water controls the destiny of human occupations and settlements. Due to lack of resources, the life is always disturbed. The vast ocean of sand means a constant struggle with nature. Their oases are their heavens. The man is energetic and moving. The outsiders do not have any attraction for these areas and therefore foreign influence on civilization is the least.) Their belongings are few. In the words of Miss Semple, "The nomad is economically a herdsman, politically a conquerer and chronologically a fighter". In all the medieval ages these wanderers of the deserts have disturbed all the kingdoms of the plains more than once.

(In the cold deserts like Tundra, the amount of snow controls their way of life. The reindeer is the main animal used for more than one purpose. Their houses are built of snow or mud. The snow birds, whale and fish provide them a part of their food. This is a region of difficult and most strenuous life.)

(Soil. Soil is the most important natural asset assigned to a country or region. Our basic needs of food, clothing and shelter are directly derived from the soil. Soil fertility determines the extent of agricultural activity on which largely depends the the growth and density of population.

Soil is something living because it provides the basic need of life, i.e., food. In the words of Wilcox, "The history of civilization is the history of the soil and the education of the individual begins from the soil". Actually the prosperity of a nation can be well judged from the nature of the soil. The soils provide a shape to the agricultural landscape of the region. The soil has shaped the destiny of the nations in the past and shaped their culture and outlook. In the words of Earl of Portsmouth, "I cannot believe that the golden age is a myth of superstition or a figment of idealists. I believe it to be a race memory, well-nigh universal of times when various peoples have achieved a way of life in harmony with nature, when they possessed the secret of

partnership with the soil, so that health, gentleness, beauty and strength were the rule. The memory was nearer to the Egyptians, Indians, Greeks and Aztecs than to ourselves". The higher stage of civilization is the product of increased fertility of the soil combined with greater experience and intellect of man. (Not only to human beings but soil provides food to the animals also which in turn again provide food to the man in the shape of milk or meat.)

(Soil is the result of disintegration of the local geological structure or the material brought by various agents of transportation. Sometimes these agents of erosion change the entire face of the land by spreading their material in heaps. The new soils are fertile whereas the soils which are in use by man for generations together exhaust their energy which can be maintained only by heavy manuring. Besides the composition of the original rock, the type of soil reflects the amount and distribution of rainfall. Based on the chemical composition, the soils may be divided into two groups: (i) acidic and (ii) alkaline. The acidic soils contain a larger amount of hydrogen whereas alkaline soils have a larger amount of sodium and lime. The organic matter also called humus increases the fertility of soil. Humus means the vegetation which has become part and parcel of the soil itself.)

(The soils brought by the rivers reflect the composition of the rocks which they erode. The red soils of the Deccan Plateau of India have large quantities of iron whereas the deltaic soils of the Gangetic plain are yellow. The laterite soils are coarse and of reddish colour. These soils are a result of abrupt changes in dry and wet conditions. These soils are therefore found in the tropics. They are highly acidic.) Laterite soils cover 41% area of Africa, 43% of South Africa and 18 % of Asia.

The soils can also be classified from the physical point of view. The soils can be sandy, coarse, clayey, alluvial or compact. The soils having more than three-fourth of sandy contents are known as such. A clayey soil contains about one-half clay. The loams contain clay, sand, lime and vegetation decay or humus. In the peaty soils there is greater proportion of acid humus.

A fertile soil is one which is sufficiently deep so that the plants can attain a good growth. A constant and regulated supply of moisture is very much essential. The temperature of the soil should be in accordance with the plant requirements. The chemical composition of the soil should exhibit a balanced proportion of humus, alkalies, nitrogen, phosphates, potash or sulphur.

Soil erosion and water-logging are two important problems in the conservation of soil. The soil erosion is checked by contour-farming or by constructing "bunds" and by terracing the fields. In water-logged areas the water-table rises higher bringing the salts nearer the surface and prohibiting the plant growth. Construction of drains in such areas is very much essential for lowering the water-table and maintaining the soil fertility. The areas of hard and baked soils which have remained without any use for centuries together with the breaking of the compact soil is a big problem which is today solved by using high power tractors. (The effect of soil erosion may be clearly noticed in the district of Hoshiarpur in the Punjab where a very large number of hill torrents locally known as "Choes" are bleaching the Sivaliks. The settlements are receding away from these hilly torrents.) In the words of Roosevelt, "If soil is gone men must go and the process does not take long". (Soil thus plays a very important role in the growth and stay of the population in any region.)

(Vegetation. Vegetation is the geographic index of a region. The general pattern of settlements can be very easily assessed from the vegetation of the region.) In the words of Brunhes, "Plants form organic groups which reflect strong influences of environment in which they live We take into consideration the entire environment, climate, soil and finally living beings and the other plants beside which and among which a certain plant is obliged to develop". The plant is only a biological organism which correctly corresponds to the moisture, sunshine availability and soils. The greatest effect on vegetation is, therefore, that of climate. The soil has the entire value for plants only in connection with climate. (From natural vegetation can be formed the idea of biological optimum and the possible growth and utility of the vegetation for man. The civilization and culture of the area revolves around the vegetation.)

A certain vegetation type is concentration in a certain region indicating climate and soil conditions. Of course, (the primitive and advanced communities change or do not change its covering according to the advancement of civilization but the basic element of vegetation is reflected in agriculture and land use. Congo Basin and Indonesia are located in equatorial region but in the case of one natural vegetation is still in the form of dense forests whereas in the other its covering has been replaced by tea, cinchona and rubber plantation—each showing a remarkable dense vegetation growth. If left to nature alone, most of the vegetation species would have vanished. It is man who has brought into existence many new species besides saving many old ones.)

(In densely forested region the settlements have its bearing. There are small scattered lumbering villages near the rivers where logs are cut and transported. Other occupations of the people are sheep or cattle rearing wherever pastures are available, hunting or fishing. In areas of advanced economy like Sweden, Norway or Canada, the lumbering work is carried on by small portable machines and small-scale industries connected with by-products of the saw mills have grown up. In Canada the work of lumbering is on a very large scale and its transport is in itself a very important occupation.) In agricultural countries of scanty and unreliable rainfall, the forests have their own place by increasing humidity and checking soil erosion and checking advancing desert. The forests are the resources of timber, fuel and raw material for various industries like paper, match boxes, sports goods and furniture.

(*Animals.* Man came into direct contact with the animals sometimes facing him in race for superiority and at others domesticating and putting them in service. Man has played a very important role by protecting various animal species from their powerful enemies when the law of jungle prevailed. The animals differ from vegetation on account of their powers of locomotion which gives them freedom of movement and to escape from the extremes of environment. Certain animals living in the snowy regions come down the higher altitudes in winter and again move back in summer. The animals by constant struggle against a certain natural force or the extremes of climate, develop their needed organs with marvellous adaptability.) The entire force or instinct is exerted to this direction. The yak has enormous strength in its shoulders, the deer in its legs. The camel spreads its feet on the sand and the reindeer runs so easily on the snow. There is natural protection from the atmosphere to various animal kingdoms—the Kashmir goat growing an undercoat of downy wool, the fur bearing animals of the arctic regions and the adaptation of the camel to the dusty warmth of deserts.

(The domesticating of animals by man is a fascinating story. The harmless and most useful animals were selected for this purpose. The fast running animals like deer and useless dangerous animals like bear and tiger could not be domesticated and therefore such animals only provided him game. The animals selected by man for domestication provided food, milk, traction, clothing material, manures, hides, skins and pleasure. The animals selected were those which can live peacefully in groups or flocks and can be easily provided with shelter. The importance of cows and bullocks in agriculture cannot be ignored. The camel provided milk, transport and leather in otherwise barren areas. Sheep and goats could be easily reared in cool and dry

regions. The poultry developed on systematic lines with the increased need of food resources.) Animals with greater power of reproduction like swine were also reared providing an important part of diet. Need of wood was in several cases more important than that of meat in domesticating sheep. In all those regions where milk or wool yielding animals were not to be found the other available animals like reindeer or alpaka were brought to the service of man. (The largest service to the mankind has been given by poultry, cattle, sheep, goats, swine, horses and camels.)

Climate. Of all the factors of environment, the climate exercises greatest influence on human activities. This effect is very much visible in the dress, way of living, settlements and diet of the people occupying a particular area. The lines of economic development are more closely connected with climate than on physical features.) In the words of Miss Semple, "It is a potent factor in the beginning and in the construction of civilization so far as this goes hand in hand with economic development." Science has played a very important role in shaping a new world but climate has been an exception. It is quite impossible to change the climate of a region. (Climate is closely related in determining the type of natural vegetation, agricultural activity, animals, settlements and human activities. It is mainly the climate which rules out certain areas for economic development. The dry hot deserts, snow capped mountains and Tundras are unfit for human use more because of unsuitability from the point of view of the climate.) Climate has a telling effect on human activity and occupations. The activity of mind and body depends upon temperature.

(Temperature extremes and dryness make more than one-half of the total earth surface of little value except for minerals or lumbering. Greenland, northern Russia and Canada as well as Antarctica are useless because of very low temperature. Vast sandy areas of Sahara or Kalahari have but little use due to scorching heat.) 55°F July isotherm limits agricultural activity and therefore separates the areas of greater and lesser density of population. (More than two-third Australia is lying empty, various parts maintaining even less than one person per 8 square miles because of very high summer temperatures.) Moderate temperature initiates greater plant growth, human activity and humming settlement.

(Moisture or humidity is a very important geographical factor.) Of course this factor has some meaning only in relation with temperature because the water availability is determined by the rate of evaporation. In dry areas it is not only the water scarcity but also the high rate of evaporation which makes the problem still more grave. The dry areas just express the tyrann-

ny of water and make it less suitable for agriculture. In such dry areas wherever there is water, there is life. (The greater amount of moisture in warm and wet areas like those of Equator has a telling effect on health and the span of life is shortened. The hard work is prohibitive and humidity has lethargic effect.)

(Climate determines the civilization and way of life in a certain region. It is the very essence of culture.) The service and look after of the guest is a very important rule of conduct for the followers of Islam. (Man needed protection from the extremes of the climate in Arabia—the country of the Prophet and therefore mutual help was very essential. This gave the idea of Islamic brotherhood.)

(Huntington has put forward the idea of climate optima. According to him the ideal climate for mental work is one with a temperature below freezing point at night and $50-55^{\circ}\text{F}$ during day time. His calculations bring out that for physical struggle $60-65^{\circ}\text{F}$ and for mental work $38-40^{\circ}\text{F}$ temperature is ideal. He has tried to make out a case for U.K. "No region on earth fully satisfies all the requirements. England and the neighbouring parts of Europe come nearest to the ideal but Northern U.S.A. — a narrow strip close to the Pacific coast from California to British Columbia and finally New Zealand fall little if any behind.")Huntington has included only Western Europe in the area of 'climatic optima' because the effect of temperate cyclones diminishes considerably towards the east. He has therefore included an area extending 400 miles from the Atlantic towards the east. This conclusion of Huntington does not hold good when applied to India. The south is warmer as compared with the north but nobody can deny that the south has given birth to no less intellectuals and areas of lower temperature in the Punjab and Jammu can be proud of their sturdy inhabitants. Of course if the conclusion is modified to say that the Tamilians or Andhrites may have shown greater mental faculties if placed in a cooler region, it may be easily acceptable. This may also be noted that seasonal range of temperature is lesser in Southern India as compared with the north. (Climate has played a very important role in the history of colonization of new countries by the white settlers. The whites have occupied the areas of moderate climate of Africa, South America and Australia. As the major parts of these continents are within the tropics, the areas of higher altitude have been occupied by the white settlers and the natives have been driven to warmer and economically backward regions.) Dr. A. G. Price while explaining the white settlement in the tropics says, "It appears from history, observation and laboratory experiments that very high temperature may damage the intellect and memory of adults. . . . It is

fairly certain that the tropical climate produces some decline in energy.....certain coloured peoples, such as Negroes and Chinese are more cheerful, and docile than are white peoples in tropical environment.....similarly certain groups of whites of Mediterranean region, fare better in the tropics than the Northern whites. It is, however, impossible to say whether this superiority is due to ethnic characteristics, to difference in cultural environments or to variations in the tropical environments occupied by the invading groups." Even in India the white rulers found it quite difficult to work in the scorching heat of the summer and every administrative unit had its summer capital located at some hill station. In north-eastern Australia the white settlers work on their plantations in winter but move to hilly areas in summer. It is just possible that later generations may not practise this seasonal migration as many white settlers in India remain in the plains even in summer now.

(*Man as Geographic Factor.* Man is a part of the environment who is obliged to put himself in complete harmony with his surroundings—to saturate himself with the environment. In a given surrounding, he is both active and passive and so many times it becomes difficult to distinguish as to what extent he is one or the other. The conception of environment is not so simple as it seems to be because so many things are influencing him directly, the effect of which can be seen reflected in his occupations and way of life. Had he been like plants which cannot move and are directly subject to climate and soil conditions, the explanation would have been simple. But he has locomotion.) In the words of Russel Smith, "Man is not merely a resident of the earth. He is a builder and geomorphic agent—an earth-changer." (Like all other agents, which are busy in modifying the face of the earth, man has played a very important role not only in cultural fields but also as a modifier of nature. The building of dams across the rivers, and changing the courses of the rivers, providing irrigation to waterless regions, afforestation or deforestation are no small achievements. The earth would not have produced all the visible commodities without him. Man has appeared on this earth as a co-worker of nature and in many cases its guide and master. Group life is a very important achievement of the human race without which the work of man would not have been so effective. His intellect helped him to bring the forces of nature to his service. He has improved upon all the phenomena given to him by nature. As long as man lives he is expected to make further contribution towards modifying his environment.) One can easily distinguish between an area untouched by man and the one modified by him by agriculture, settlements, roads, railways, industries and so many other things.

One thing may be noted that man is not the creator. He is a modifier or a changer. He can bring out new shapes from already existing matter. He is an agent for creating life but cannot sustain life for ever. He can win over diseases but cannot conquer death. But as an agent for furtherance of life and human species, his importance cannot be denied. By his skill he has improved and modified other animal races as well as human race. (Thus as a geographic factor he is the main mover, modifier and changer of human activity, resources of this earth and environment. His limitations are therefore the things with which he is struggling with vigour. Human life is nothing but a constant tussle between human body and environment especially climate.) Human body cannot stand the combined effect of nature. Man's effort is visible in his trying to increase the span of life in every country. The problems of human race in group life are immense affecting physical and mental makeup.

Man working as institution in a chain of life faces nature. It is his efforts and adjustments with which we are mainly concerned in the study of human geography. Geography is the study of the earth and man. Man lives upon the earth, depends upon it and becomes a part of it.

CHAPTER 4

NATURAL REGIONS

(*Concept of a Natural Region.* Areas of the earth's surface lying in close proximity to one another are often found to differ markedly in respect of climate, vegetation and other resource patterns. The same type of climate does not prevail all over the world. Countries near about the Equator are generally hot and humid; those in the middle latitudes commonly possess a dry type of climate; the polar regions, again, are cold and arid. Thus, for instance, the climate of Great Britain is quite different from that of India and the climate of the Mediterranean regions quite different from that of the Sahara or Siberia and differs obviously in vegetation and other resources. Not only that; even in the same country, different regions may have different types of climate. For example, Sind or Rajasthan differs considerably in this respect from Bengal or Assam or the extreme South.) But there is another side of the picture too. It is found, for instance, that widely apart areas sometimes seem to exhibit such resemblances as to be identical. Such as the climate of the lands surrounding the Mediterranean Sea is very similar to that of so distant a place as California in North America or to that of certain parts of Western and Southern Australia or Chile in South America. And (since climate exerts a most profound influence on soil and vegetation, regions having similar climatic conditions are also much alike one another in respect of soil and natural vegetation.) And what is perhaps more important from the human point of view, agricultural methods which have proved suitable to one of these regions prove to be equally so in any one of the other regions, provided that the economic and other conditions are equal. The products which flourish well in one area will also thrive equally well in others, if two places agree in climatic conditions. Oranges, for instance, thrive best in Spain, Italy, California, the Cape Province of S. Africa and Western and South Australia. "So there has been evolved the conception of series of major natural regions, of major environments."¹ (The natural regions are then, the areas which agree in all natural conditions such as relief and structure, climate and life, both vegetable and animal and in the general method of living. From what has been said above it is clear that climate is the determining factor. These are called Natural Regions.) It is one of the most fruitful conceptions of modern geography, and we owe to the late (Professor A. J. Herbertson of Oxford) who first oriented this conception. (In his words the Natural Region is "an area of the earth's surface

¹ Stamp, *Commercial Geography*, p. 11.

which is essentially homogeneous with respect to the conditions that affect human life."²

It has now been found that the entire land surface of the earth may be divided into nearly a dozen well-marked areas, which can be defined either in terms of climate or of vegetation. But it should, however, be borne in mind that (these divisions are not like watertight compartments. The boundaries of the natural regions are only vague, for the natural conditions characterising one region do not abruptly cut themselves off from those found in other region. Therefore no sharp line can be drawn to mark off one region from an adjacent area, as one type generally tends to merge by degrees into another. And since the change is very gradual and not quite abrupt except in regions sharply outlined by such natural barriers as oceans and mountain ranges, much of the intervening tract between two regions can best be regarded as a transitional area. The physical conditions, moreover of two widely separated places are not fully identical; and since location and physical features have well-marked influences on the climate of a place, considerable local variation is seen even in areas grouped together as forming one natural region. A classification of natural regions primarily on a climatic basis can best be only an approximation, and the placing of regions in a particular category means that they have more resemblances than differences in common. In naming these regions, geographers, however, try generally to keep close to the dominant character of the climate in each. But since the influence of climate on vegetation is most intimate, a specified region is sometimes named after its prevailing vegetation. Thus, for instance, we have such names as Temperate Grassland, or Prairie and Coniferous or Deciduous forest belts for regions having a Temperate Continental climate and a Cold Temperate climate respectively. Sometimes again, natural regions are named after a place held to have quite typical climatic conditions. Thus there are regions with a China type of climate or the Sudan type or the Manchuria type or the Sahara type. (But we must always remember that the climate—not place is the chief factor here; vegetation though important is largely dependent on it. So it is desirable to use climatic names.) And if still natural regions must have 'regional' names, it is better to christen them after the climatic zones of the earth than after place names having little, if any, real geographical value..

But before proceeding further we must, however, consider that natural regions and the political regions are not one. They are fundamentally different. The former is the region natural

² Herbertson, 'Major Natural Regions': An Essay in Systematic Geography, *Geographical Journal*, Vol. XXV, p. 300.

in true sense, while the latter is an artificial or man-made creation. The political region may overlap a natural region or may fit in one natural region several in number. However, they can be adjusted to them. But natural regions are independent of human choice and cannot fall a prey to his whims.

The concept of a region has not undergone a change and has attained a great sociological importance. We owe Dr. R. K. Mukerjee for this new conception, who is not only the pioneer but who has also enunciated the study of "regionalism in various fields of social research in India."

(The basic concept of a region is embodied in physical environment. The physico-environmental factors are an important portion of the world stage, and its relation to every other portion forms a unity. The combined influence of these factors determines the regional pattern and conditions the mode of life of the inhabitants in a given habitat.) We know that (there is a definite relationship between the physical environment and natural resources in different regions of the earth. Regional differences in the kind are quite obvious from the facts that one region is mainly agricultural and another industrial, one small region produces a larger quantum of certain resources than another comparatively larger in size, certain varieties of products are raised in one region and different ones in another, or that one region may abound in mineral resources but lack food materials. There may also be found a wide diversity of occupations in one region, but a narrow range of occupational mobility in another. Finally, one region may contain a healthy, energetic and progressive population, while the other accommodate only physically debilitated, mentally handicapped or culturally backward groups of humanity. These regional differences are in large measure due to the measurement of a people's economic strength and social progress.) Not only this, but as a representative unit of the physical environment, a region becomes the true index to the magnitude, nature and variety of resource potential, and stands in a resource relationship with its immediate neighbourhood and with the rest of globe.

We know that certain regions well endowed with Natural Resources might not indicate equal degree of strength and economic progress. But regions with meagre resources are thickly populated, but some highly resourceful areas are abandoned as of no use to civilised man. There are pictures of settled village economy and prosperous life in one region, and sparse and shifting habitations of discontented groups of humanity in another. Cultural differences reflect to a large extent the characteristic advantages or limitations of regions. A brief survey of the world's natural regions is made in the following paragraphs:

We may discuss the natural regions under the following heads:

- (i) Regions of Bounty.
- (ii) Regions of Increment.
- (iii) Regions of Efforts.
- (iv) Regions of Arrested Development.
- (v) Regions of Lasting Difficulty.

(1) *Regions of Bounty.* These regions include Equatorial lowlands and plateaux, e.g., Malaya, Eastern Archipelago, Ceylon, coastal margins of south-western India, western Africa, parts of Amazon and Congo basins and north-east-south America. Here nature is bountiful and man is mere gatherer rather than the active producer of things he requires. A very heavy rainfall, uniformly high temperature, and high humidity, facilitate a vigorous growth of luxuriant vegetation and rapid multiplication of animal life. Here in lowlands, or elevations the struggle of constant encroachments of plant and animal communities is more often frustrated and defeated. Unhealthy climate reduces human vitality to the minimum, and restricts economic and social progress of the inhabitants. In view of the valuable resources in food and raw materials, these regions comprise the greatest reservoir of wealth and make an overwhelming contribution to the world's business today.

The notable features of these regions are: (1) There is not only an immense variety of vegetable products, but a rapid growth of vegetation; (2) Important products are derived from forests and plantations, but agricultural and animal resources are not of much commercial importance. (3) Though the distribution of wild animals is large and varied, valuable domestic animals are scarce and poor in quality. (4) Due to the scorching heat and beating rains, the land is rapidly weathered and leached, hence agricultural crops are poor in quality, yield and food value. (5) The distribution of minerals is, on the whole, poor, and mining operations are generally restricted due to excessive heat and humidity. (6) (In view of the prevalence of tropical diseases, difficulties of transportation and lack of availability of energetic and sustained labour,) accessibility to potential resources is difficult and, therefore, full and regulated exploitation is not possible.)

(2) *Regions of Increment.* These regions are very similar to the Regions of Bounty. Both have hot climate and heavy precipitation. But Regions of Increment receive seasonal rainfall, and are characterised by hot wet summers and cool dry winters. Such regions include the typical monsoon lands, in-

cluding India, Burma, Indo-China, Ceylon, etc. A wide range of temperature and rainfall, coupled with marked seasonal changes, are the most favourable conditions for the growth of vegetation and animal life. Monsoon lands, therefore, abound in forests, plantations and animal resources, and make agriculture the most successful and productive industry. The application of effort in these regions results in a proportionately greater production of wealth. Consequently, the density of population per square mile is perhaps the highest in the world. The main classes of natural resources are of vegetable and animal origin. Vegetable resources comprise timber and fuel wood, minor forest products (lac, gums, resin, dyeing and tanning substances, bee-wax, honey, herbs and drugs and various types of grasses), plantation crops (tea, coffee, rubber, cinchona, banana, pineapple, sugarcane, coconut and spices), agricultural crops (wheat, rice, maize, millets, pulses, oilseeds cotton, jute, hemp, fodder and tobacco, etc.), etc.

The resources of domestic animals are hides and skins, milk, flesh, wool, hair and bristles, dung or fuel and manure, and animal services for cultivation and transportation. The distribution of warm water fishes, sub-tropical poultry, and other floral and faunal resources are indeed very great.

The main features of the Regions of Increment are: (1) Abundance of vegetable resources, agriculture being the primary source both of foodstuffs and raw materials supplemented by forest and plantation products. (2) The largest concentration of domestic animals whose services and products are indispensable for the existence of inhabitants. (3) The range of agricultural and forest products is unsurpassed by any other Resources Area of the world. (4) The soil is well supplied with moisture and organic manure, and is generally capable of producing two or more crops in a year. (5) Due to marked seasonal variation, there is a great possibility of acclimatizing exotic varieties of crops and animal types. (6) The distribution of minerals is fairly wide and substantial and waterpower resources in rugged relief ample for the industrial needs of the people. (7) Though human energy and efficiency fluctuate in harmony with the alternation of season, the people are of moderate health and energy, and by far most progressive of the peoples of vegetable civilizations.

(3) *Regions of Efforts.* Such regions are found in the temperate zone, and divided into two distinct groups, viz., Cool Temperate lands and Warm Temperate lands. These lands on the western margins of the Cool Temperate zone are characterised by temperate deciduous (hard wood) forests of oak, beech, elm, maple, and birch. Wherever forests have made way for pasturing and agriculture, cereals, fruits, roots, fodder crops, hemp and

flax are raised; sheep are reared for wool and mutton, and cattle for beef, milk and hides. Lumbering, fishing, fruit-farming, cattle and sheep-rearing are the main industries.

The lands on the eastern margins have agricultural and pastoral occupations similar to those of western marginal lands, and forests and fisheries constitute their most valuable resources. The forests are largely deciduous, but conifers (soft wood) are fairly distributed. The climate of these cool temperate lands, on the whole, is most favourable for human activities. The people, therefore tend to be virile and industrious, and the energy expended by them is amply rewarded. These regions have become essentially industrial and together they contribute the greater moiety of the total manufactured goods entering the world's commerce.

(The Mediterranean lands (Warm Temperate Regions), on the other hand characterized by hot dry summers, and warm wet winters, have a natural vegetation adapted to resist the drought and heat of the summer, e.g., olive, oak, walnut, chestnut, cork oak, fir, cyprus, cedar, mulberry, and plants yielding resins, waxes, and essential oils. Natural pastures are rare, and therefore, cattle are not reared, in large numbers. Hard varieties of wheat and barley are grown in large quantities, but rice cultivation is restricted to water areas. Cotton is grown where artificial aids to irrigation are available. Fruit resources are by far the most valuable, chief among which are the citrus fruits (orange, lemon, grape fruits), the grape, fig, olive, apricot, peach, mulberry leaves are utilized for feeding silkworms and cocoon rearing is an important industry. (But the people of the Mediterranean climate have to put forth less effort than the peoples of the cool temperate regions in order to gain a living from natural resources.) As a result, they are commercially less progressive, but they have devoted their imaginative minds to the development of such cultural traits as the arts and civil organisation. On the whole, however, the regions of efforts respond adequately to human effort, and man is rewarded generally in proportion to energy expended.) Inhabited by healthy, energetic, and enterprising races, such regions are the most developed economically and their highly advanced material culture makes them essentially the spheres of industrial civilisation.

(The characteristic features of the Regions of Efforts are as follows:

(1) Agriculture is subservient to pasturing, fishing, lumbering or fruit farming. (2) The basic food materials and raw materials are derived from animal including birds and fish resources. (3) There is a lack of vegetable foodstuffs, and raw

materials essential for manufacturing industries. (4) The climate favours the fullest and continuous exploitation of minerals, and the mining industry, wherever possible is highly developed. (5) Both mineral fuels and water power are adequately distributed and utilised. (6) The supply of energetic and efficient labour is largely responsible for a rapid and profitable development of Natural Resources. (7) Due to the scarcity of vegetable foods and raw materials the people of these regions are animated by a tradition of commercial enterprise, and not unoften their greed, motivated by their needs, for these basic resources, compels them to employ an aggressive technique in dominating the peaceful peoples of vegetable civilizations.

(4) *Regions of Arrested Development.* Such regions are those, where on account of adverse geographical conditions, man ekes out a bare subsistence even with the best effort applied. Here nature does not reward man in proportion to his effort, that is, there appears a lag between the degree of effort applied and the magnitude of effect produced. (Economic progress is, therefore, slow and restricted. The necessity of developing such regions arises from the fact that a country has to support a fast growing population. The Regions of Arrested Development are so named because in them the limit of maxima exploitation is soon reached, and further application of effort gives a diminishing return or becomes entirely unproductive.) Since, these regions lie on the margin of productive exploitation, their occupation or abandonment is decided upon by fluctuations in population pressure. Wholesale migrations or high mortality, sooner or later, result in their abandonment. (These regions are found on the fringes of Equatorial Belt, the borderland of deserts, in cold temperate intra-continental areas, arid mountains and plateaux, and the swamps of tropical deltas.) Although the application of science has enabled man to extend the cultivation of arid lands, to reclaim tropical forests and swamps, and to convert mountain sides into valuable terraced fields, human ingenuity fails to control the all-powerful geographical conditions, and the margin of economic gain is decidedly the least attractive.

(The main features of these regions may be summarised as below:

(1) There is a limited variety of natural vegetation, therefore, vegetable resources are generally meagre. (2) Agriculture is an unproductive enterprise, the main occupations being pasturing, meadow husbandry, and wherever possible, lumbering and fishing. (3) The food materials of vegetable origin are coarse and scanty, i.e., barley, rye, millets, and potatoes, while vegetable raw materials are wood and fibre. Animal resources

are naturally adequate, but leave no exchangeable surplus. Fishing and lumbering, however, are comparatively more productive and their resources form the main items of trade. (4) Here minerals occur in large quantity and variety. Therefore, both metallic and non-metallic minerals, wherever accessible, are exploited profitably, and constitute the most valuable resources of these regions. (5) Water power resources counterbalance the absence of mineral fuels, and their development, as in the case of Scandinavian and Alpine countries has given rise to industrial enterprise. (6) The people, though hardy, are progressive in comparison to the people of the Regions of Effort. Due to limited supply of foodstuffs and raw materials, aggravated by difficulties of resource development the economic development of these regions is hindered, and the people are contented with limited material welfare and a stagnant social organisation.

(5) *Regions of Lasting Difficulty.* These regions are the cold and hot deserts, the Equatorial forest belt (5° north and south of the Equator), the interior of the Amazon and Congo basins, the parts of the East Indies and the lower Guinea coast of west Africa. Here geographical forces tend constantly to overwhelm and defeat the activities of modern men. The struggle for existence is very severe, and the development of economic life is a pathetic story of great suffering and privation. At present the Regions of Lasting Difficulty are of little economic importance, except in areas where minerals are found, such as Yukon, which has gold supplies; the island of Spitsbergen, which yields coal; the Mackenzie valley, where oil abounds; etc. Many regions, which are reclaimed after surmounting serious obstacles and developed under dire economic pressure when the effort ceases, are soon engulfed by the mighty influence of surrounding forces. Therefore, permanent settlements and stable economic enterprise are not yet possible in such regions. The natural resources of all these regions are scanty and monotonous. In most cases the potential resources still lie unexploited, while in others, exploitation is hindered and often made possible due to resistant climate. In the cold deserts, the land, permanently covered with masses of sheet-ice, is practically barren and supports no life: but the seas are extraordinarily rich, containing large supplies of fish. Bird life is considerable, the principal bird being penguin. Polar bears and polar foxes are well distributed. On the fringes, where land is freed from snow in the short summer, quick-growing vegetation supports herds of reindeer. The summer brings swarms of lemmings, foxes, hawks, gulls, goose, brant, swan, crane, loon and various species of duck. The inhabitants are nomad hunters who depend largely on animal, fish and bird resources, which provide a precarious livelihood. In the hot deserts, total absence and great scarcity of rainfall, and a great range of temperature both between day

and night and summer and winter, make vegetable and animal life precarious. Dry pastures support sheep, and camels are the only means of transportation. Unlike the cold deserts where all basic products are drawn from animal resources the basic foodstuffs and raw materials in hot deserts are derived largely from vegetable resources. In the tropical forests and tropical lowlands, there is no dry season, and constant high temperature and heavy rainfall make the atmosphere particularly oppressive. The oppressive climate keeps the people stunted in growth and mentally arrested in development.

(The main features of the Regions of Lasting Difficulty are:
(1) Scarcity and lack of diversity in Natural Resources, which give little contentment to the inhabitants. (2) Physical conditions constantly thwarting human control and making economic enterprise difficult. (3) Lack of sources of energy which, where available, can be fully accounted for, hence, industrial development is impossible. (4) The surplus resources are not indispensable for human existence in other regions which makes exchange less profitable. (6) Conditions of life in general repel colonizers from other regions and therefore, there is little movement of population and dispersion of culture in consequence.

CHAPTER 5

MAJOR NATURAL REGIONS

The natural conditions, on the face of the earth, are widely distributed, and are determined by latitude, altitude, and situation relative to land and sea. In so far as this distribution is wide natural regions fall into groups of two or more, which represent approximately the same natural conditions, and the most representative may be regarded as a type. In speaking of natural regions, the following considerations should be noted:

- (1) The physical conditions are never fully identical in any two widely separated areas and, therefore, it must not be supposed that because they are classified as belonging to some particular type of natural region, they have all conditions in common.
- (2) Secondly, the classification of natural regions primarily on a climatic basis, is at best an approximation and the placing of regions in a particular category means that they have more resemblances than differences in common.
- (3) Thirdly, the limits of any natural region are also approximate. The change from one natural region to another is often very gradual and not abrupt.
- (4) Finally, natural regions do not conform to political boundaries. The study of natural regions is of great practical importance because the lands in each region can be developed on similar lines.

The whole of the earth's surface has, therefore, been divided into 'major natural regions'. According to Professor A.J. Herbertson the chief major natural regions are:—

MAJOR NATURAL REGIONS OF THE WORLD

1. *Tropical Hot Lands or Equatorial Regions:*
 - (1) Wet Equatorial Forest Region or Amazon region
 - (2) Summer Rains or Monsoon and Sudan Region.
 - (3) The Hot Desert or Sahara Type.
 - (4) The High Plateau or Bolivian Type.
2. *Warm Temperate Regions:*
 - (1) The Western Margin or Mediterranean Region
 - (2) The Eastern Margin or China Regions

- (3) Interior Lowland or Turan Type
- (4) Interior Highlands or Temperate or Iran Regions.
- 3. *Cool Temperate Regions:*
 - (1) Western Margin or West European or Temperate Oceanic Regions.
 - (2) Eastern Margin or St. Lawrence Type.
 - (3) Interior Lowland or Siberian Type.
 - (4) Interior Highlands or Altai Type.
- 4. *Polar Regions:*
 - (1) The Lowland or Tundra Type.
 - (2) The Highland or the Icecap Type.

THE EQUATORIAL REGIONS

Climatic Conditions. The Equatorial Regions, as the name implies, stretch almost as a continuous belt on both sides of the Equator between 5° .N and 5° . South, and occupy an area of about 600 miles in width encircling nearly the entire land surface of the earth. The range, however, is often wider; but the extreme limits rarely exceed 10° . N and 10° . S. The main regions lying within this belt are: the Amazon basin of South America; the Congo basin of Central Africa; and Eastern Archipelago with the adjacent areas of the mainland.

The equatorial region is characterised by uniformly high temperature throughout the year. It has been estimated that an acre of land at the Equator receives 26 per cent more heat from the sun each year than an acre situated in latitude 40. The average temperature fluctuates only between 75° . and 80° F. The seasonal range is usually only 5° .F, often even less. The diurnal range is also small—usually less than 20° .F, sometimes even less than 10° .F. But we should not conclude that these are the hottest parts of the world; for although the temperature is uniformly high all the year, it seldom rises above 100° .F, and mostly does not rise above 90° .F; while on the other hand, it never falls below 70° .F. The example selected to illustrate this climate is PARA.

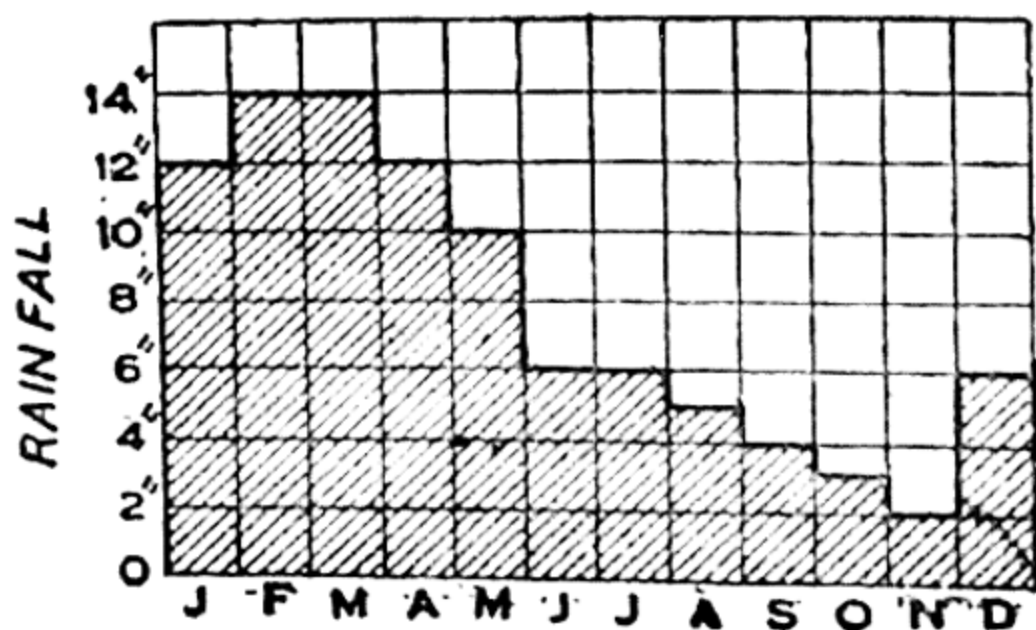


Fig. 1—Equatorial Type—Para

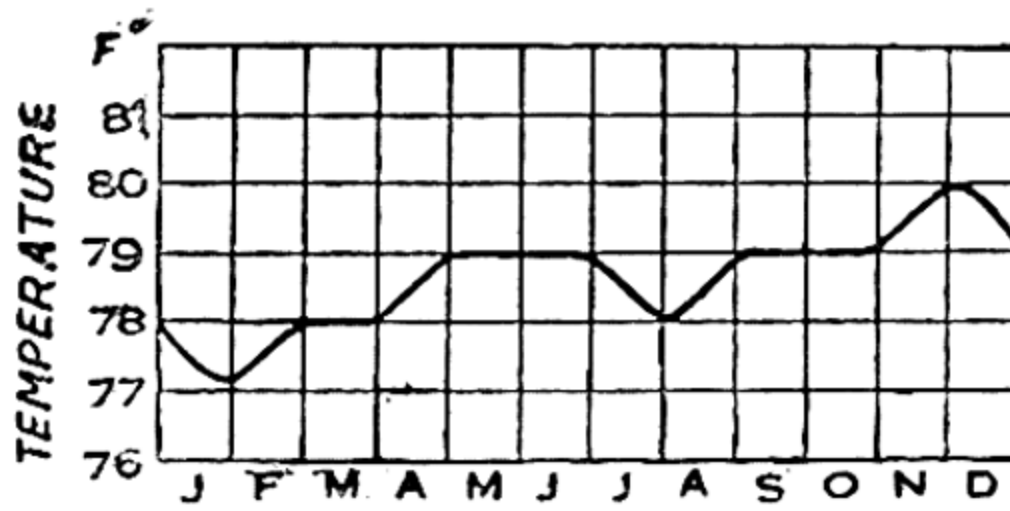


Fig. 1B—Equatorial Type—Para

These are the regions of 'rain at all seasons', i.e., rain falls throughout the year, and since they, for the most part lie, in the belt of Calms or Doldrums the precipitation is mostly of the convectional type. The heating of the trade winds blowing towards the equatorial low pressure belt sets up a convectional current, with resultant expansion and cooling and consequent heavy precipitation. So there is here no typically "dry season" except in a relative sense, and there are periods of maximum and minimum rainfall. There are two periods of heavy rainfall, viz., soon after the equinoxes (March and September), following the passage of the overhead sun. The average annual rainfall for the whole region is between 70 and 80 inches; but the regions cut off from maritime influences have usually less rain.

The four seasons of the temperate zone are unknown, for it is always hot and wet. Rain of the thunderstorm type falls on most days of the year, usually afternoon. The days are always 12 hours and the nights 12 hours, so that the sun rises at 6 a.m. and sets at 6 p.m. every day. Although the trade winds and the monsoon originate in areas north and south of the Equator, but the equatorial regions are not untouched from their influence, only the interior forest areas are deprived from their effects. Typically the equatorial belt is the Belt of Calms or Doldrums where there is no marked wind or wind direction.

Vegetation. The vegetation is forest, called 'Selvas'. Uniform heat and abundant moisture induce a luxuriant growth of plants; vegetation is much more profuse in the Equatorial Regions than in any other part of the world. The forest always looks green, for though many of the trees are deciduous, they do not all shed their leaves at the same time, as there is no marked seasonal rhythm in the climate. Thus it is possible to see one tree in full leaf, one devoid of leaves, one bearing fruit, and another bearing flowers all within a short distance of one another. Another characteristic of this forest is the great variety of trees. In the temperate coniferous forest the same kind of trees may,

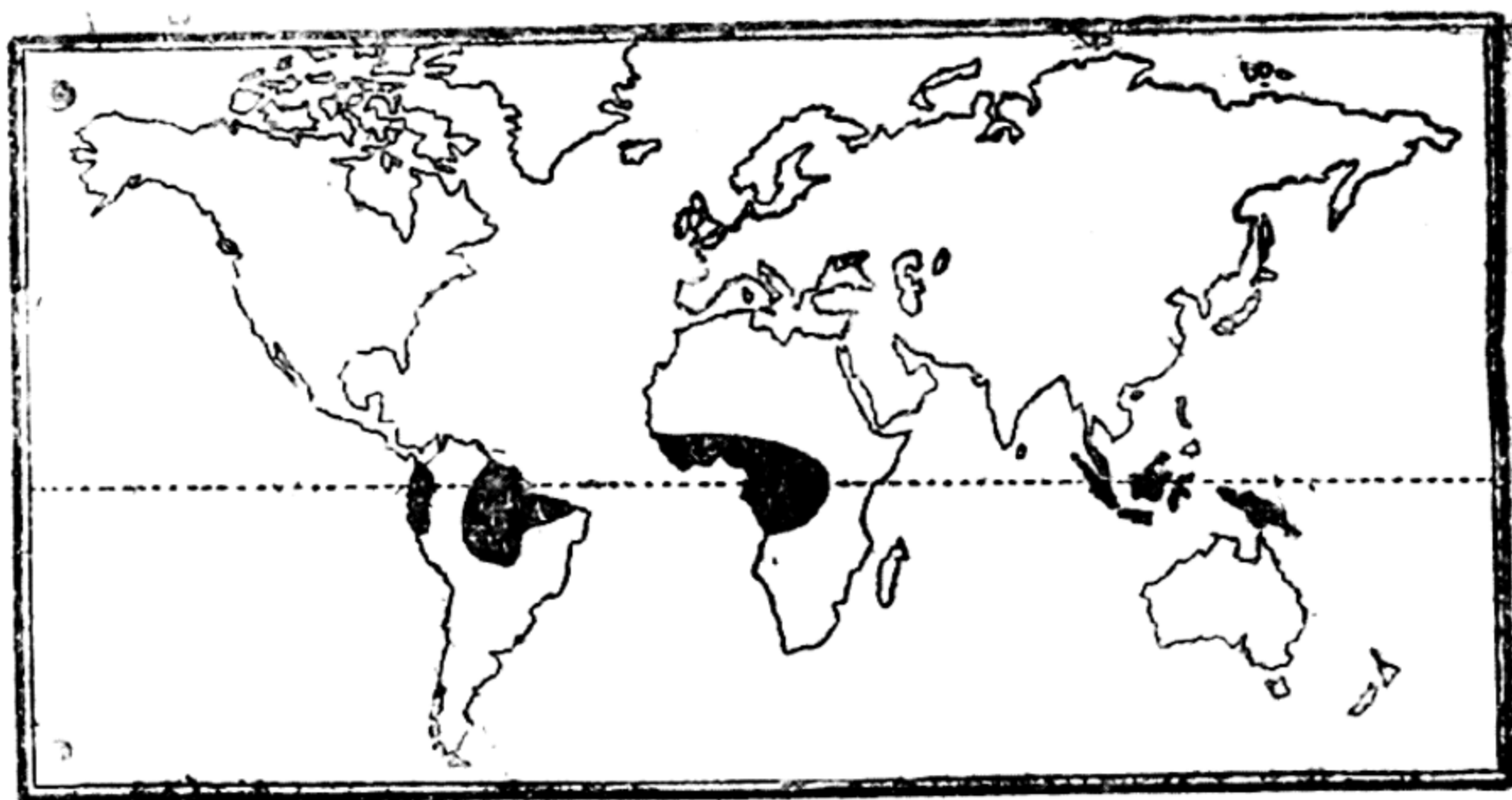


Fig. 2—Equatorial Regions

grow for mile after mile, but in the equatorial forest there may be only two specimens of the same tree on an acre of ground. Among the important trees are mahogany, rose wood, iron wood, green heart, and the rubber and cacao trees. The true selva has a closely interlocked canopy formed by the crowns of the trees. This shuts out the light from the lower part of the forest, which is, as a result, dark, damp, and gloomy, with little undergrowth. Giant liannas or vines twine from tree to tree, and some hang from the branches and coil in great tangles on the ground. Where the forest canopy is less compact and sunlight can penetrate, dense undergrowth develops. These forest areas are not easy to clear, and when cleared, weeds and small bushes grow with amazing rapidity.

Animal Life. Grazing animals are rare in the equatorial region because, grass is almost entirely lacking in these areas. Animal life in these parts is almost wholly restricted to the tree-tops; monkeys, tree-frogs, tree-lizards, etc., are abundant; So are also those that can subsist on nuts and fruits like the wild hog and the tapir. Birds are of various types and abundant. The streams abound in crocodiles, alligators, turtles and fish, and the hippopotamus is by no means a rare sight. Serpent life ranges from the tiny water snake to the huge python or boa constrictor. And to complete the picture we have here an abundance of native insects—the black ants, white ants, tsetse flies, fire-flies, gnats, beetles and mosquitoes, to name but a few.

The popular idea is that the natives of these regions are very backward and stunted both physically and mentally. But in condemning them we ought not to lose sight of the true per-

pective; the denser equatorial forests are very sparsely populated, and there is, therefore, little scope and less urgency for development. The equatorial forest tribes, particularly the American Indian tribes of the Amazon basin and the Pygmies of the Congo basin, are primarily hunters and fruit-gatherers, subsisting on fruits, nuts and game of the forest. Many groups of forest people have taken to farming, hunting, fishing and fruit gathering forming only supplementary occupations. As for the Equatorial Asiatics such as the Malays, the Javanese, and the Dyaks of Borneo, it may be said, they have almost outgrown the hunting and fruit gathering stage. The impact of the Western civilisation, however, has not been an unmixed blessing for these peoples. The long out-worn systems of serfage and peonage have been introduced in one form or another throughout the new white settlements. The total effect of this contact has been an unmitigated evil to the natives, and far outweighs the few amenities of civilisation they have been taught to taste.

The equatorial regions are temptingly rich in economic possibilities. They abound in useful trees, fruits, nuts and gums of almost an endless variety. Agriculture is the productive industry and many commercial products like rubber, tea, cocoa, sugar and palm-oil enter into the world trade. These regions are important especially for forest resources but due to many unavoidable difficulties, their exploitation is too expensive and unremunerative. Only cabinet woods and dye-woods with few other varieties for decorative purposes have entered into world trade up to the present time. Like equatorial agriculture, forest industry too had to await suitable conditions for development and is bound to be slow until it is aided by science.

Another future possibility for the equatorial forests seems to be as a source of power. Some of these regions are rich in water power, and it may not be an idle fancy that some day these potential resources will be utilised with advantage.

TROPICAL REGIONS

The Tropical Grassland or Savanna Type. The Tropical Regions as the name implies, lie with the Tropics of the equatorial belt. The Sudan of Africa is commonly said to be typical of them; hence it is also characterised as the 'Sudan Type of Climate'. And since the typical vegetation is grass, therefore it is often called "Tropical Grassland". The chief areas belonging to this type are Central America, the Orinoco Basin and Guinea Highlands in upper South America, the Brazilian Highlands in Central South America, the Guinea Coast and Sudan in Africa and northern and north-eastern parts of Australia.

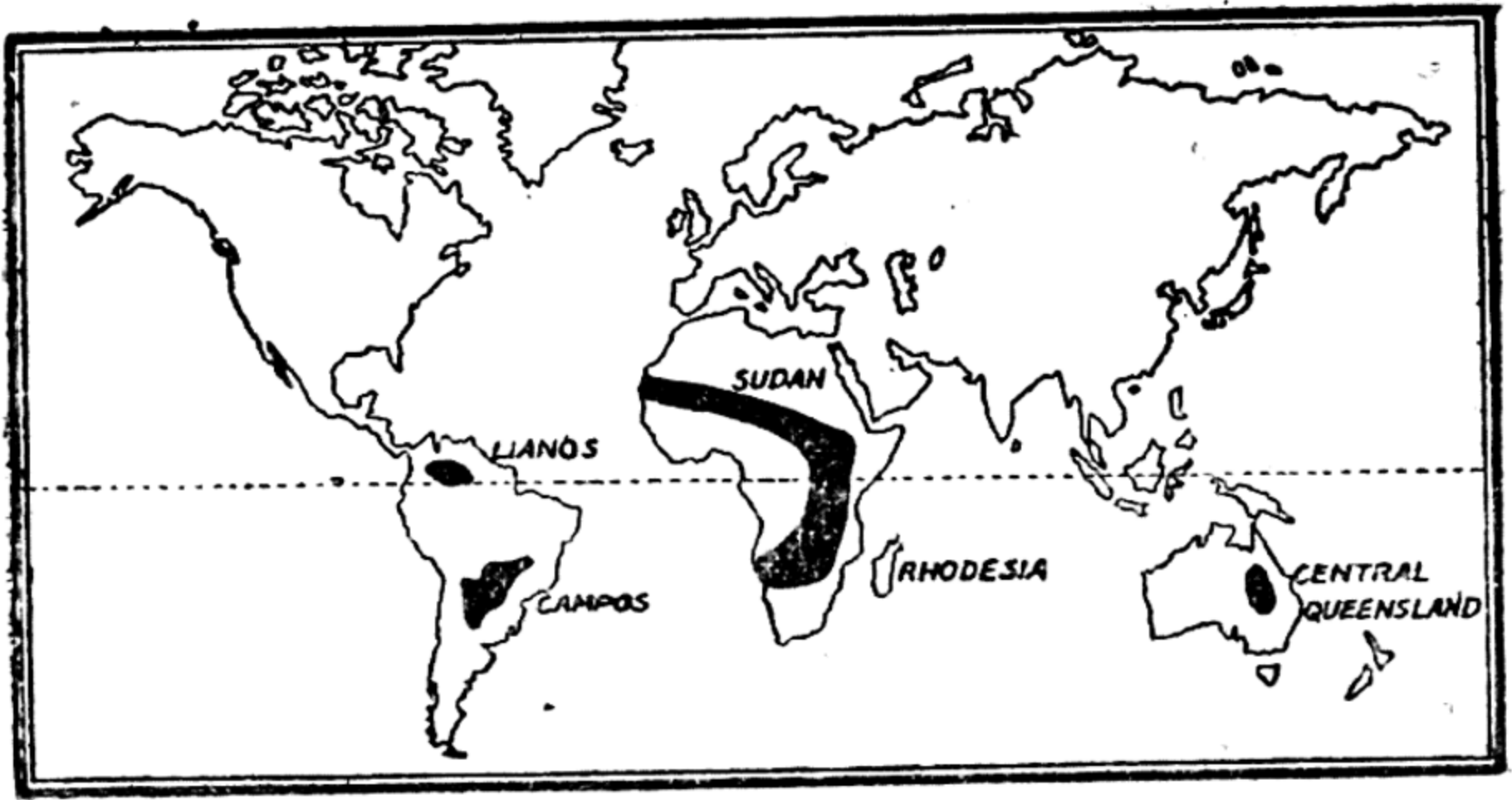


Fig. 3—Savanna Regions

The temperature of these regions during the summer months often even exceeds that of the equatorial regions. But the point of contrast lies in the great seasonal range of temperature. Both the seasonal and diurnal temperatures of these regions are marked by wide fluctuations. In the drier parts there is usually a seasonal variation of 30°F and sometimes even 40°F , but in areas lying close to the equatorial belt with their consequent heavy rainfall such fluctuations of temperature are not to be found. The disparity of the diurnal range, however, is much greater, depending as it does on local conditions; thus quite an average of even 115° has been recorded along the margins of the steppe.

Rainfall is also characterised by a corresponding variation. In some of the wettest parts it may be as much as 200 inches a year. Sometimes even considerable more; others have an average of 70 to 80 inches; while on the desert borders it may be 15" or less. Whatever be the amount of rainfall for the year, the tropical regions have a distinctly dry and distinctly wet season, and it is possible in most cases to distinguish at least three seasonal changes in a year (a) a cool dry season is almost invariable followed by (b) a hot dry season, which in its turn, yields place to the (c) wet season. Most of the annual precipitation occurs in spring and summer, and the winter is almost wholly dry. The town selected to illustrate the Savanna type of climate is BULAWAYO in Rhodesia.

The typical vegetation is grass among which trees are scattered here and there like sentinels, and is often termed "parkland". Actually the vegetation varies considerably from

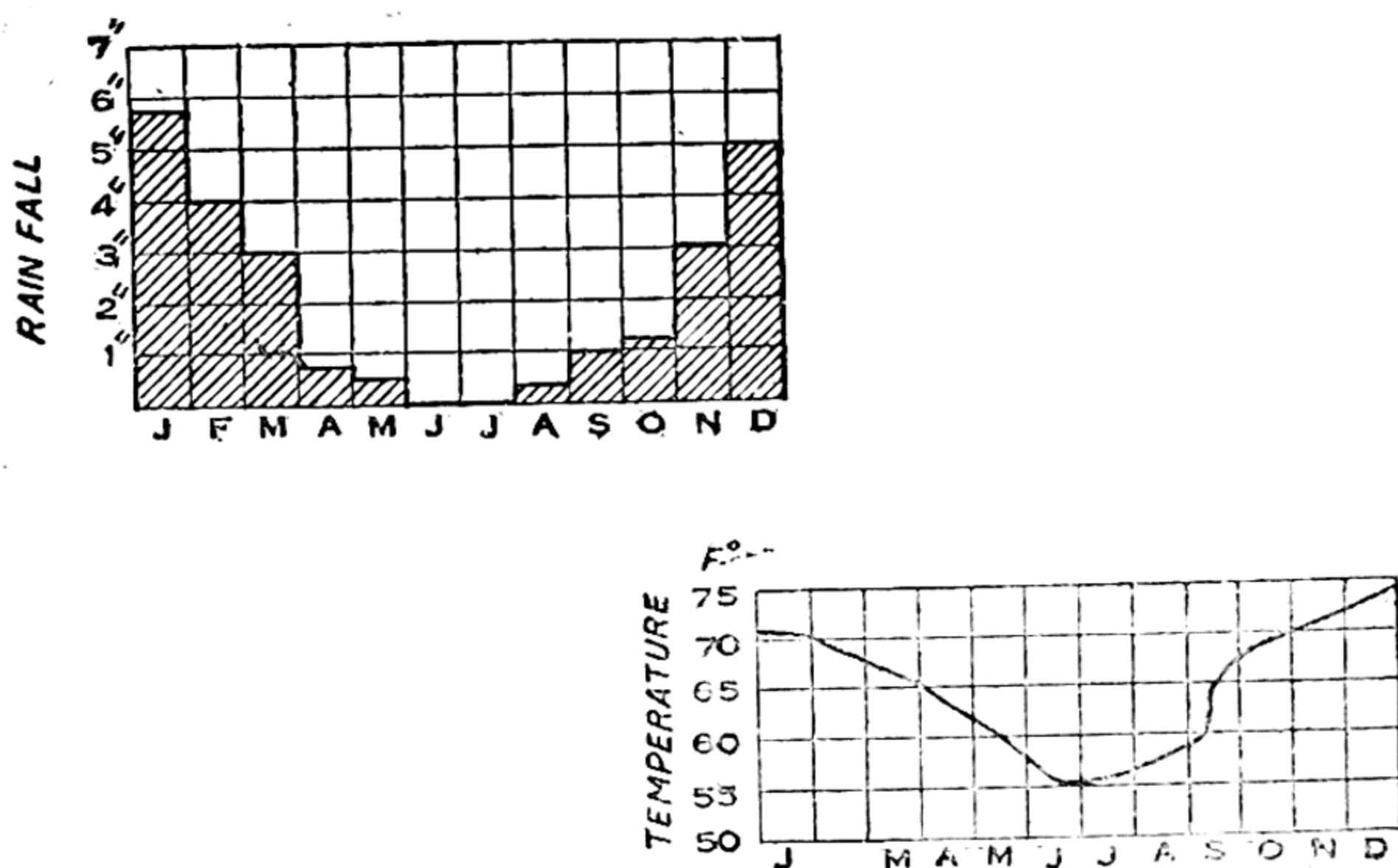


Fig. 4—Savanna Type—Bulawayo

the desert margins to the forest margins. Near the desert the grass is poor, and these are scattered thorn bushes. The grass becomes richer and trees more frequent as the forest is approached, until, finally, there are large wood land tracts, with intervening grassy areas. Although the Savanna is a grassland, it does not resemble either the English meadows or the temperate steppes. The grass often grows 5 to 10 ft. high, and has a dry appearance. In some districts impenetrable elephant grass reaches a height of 12 to 15 ft.

Tropical animal life is easily divided into two main groups (a) the herbivorous animals, mostly fleet of foot, represented typically by the giraffe and the antelope and (b) the great carnivorous animals, such as the lion and the tiger, preying upon the former group. Monkeys are abundant in the forest areas, and the birds are fairly well distributed all throughout. Swarms of locusts are another formidable factor to contend with.

Since the tropical regions are themselves rather various, human response has also been not of any one type. The chief occupations of the Savanna people are said to be hunting and cattle rearing. But agriculture is by no means of lesser importance, since "the natural grass which flourishes in the Savanna may be replaced by the cereal. Indeed many of the Savanna people are essentially farmers. Maize and millets amongst the

cereals as well as cotton, sugarcane, groundnuts, and various oil-seeds are sidely cultivated in these regions.

The development of these regions has been retarded by various causes, such as shortage of labour, poor transportation facilities, distance from the markets, and the political unrest. Moreover grass land regions are sparsely populated. In African Savanna the density is less than 20 to the square mile, while in the South American grasslands, it is as low as 4 to the square mile. Another handicap is the uncertainty of rainfall which generally results in famine.

None of the Savanna areas is highly developed as yet, but they hold great promise for the future. As they are never cold, crops can be grown all the year round, hence they should, in future, yield temperate crops in the winter season with irrigation, if necessary, and tropical crops during the summer season. Thus they have great possibilities for the extension of cotton cultivation, and the production of tobacco is steadily increasing in Rhodesia.

HOT DESERT REGIONS

The location of hot deserts is extremely significant. Approximately they lie between latitudes 20 and 30 on the poleward margin of the Tropical lands. They are situated within the high pressure belts and on the western side of the continents—the regions of “dry trade winds”. Therefore, rain bearing winds generally fail to reach them. On the contrary, currents of air descend on them which cause the wind to blow outward. The Mexican, and the Chilean desert of the Americas, the Sahara and the Kalahari and Somaliland in Africa; Arabia, Iran, Afghanistan,

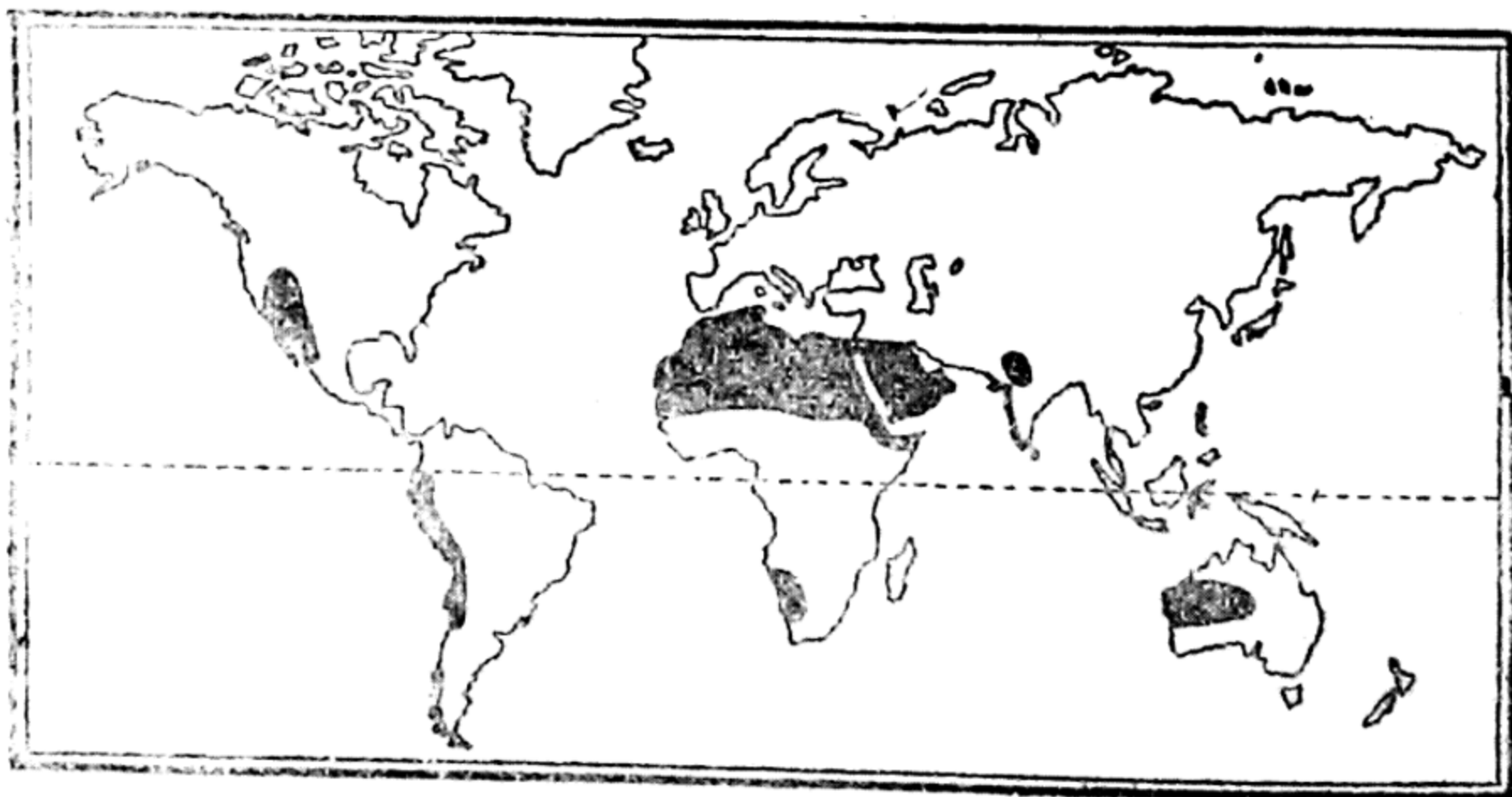


Fig. 5—Hot Deserts

Baluchistan, Sind and Rajputana in Asia, and the western Australia fall within this group. It is interesting to note that continuous stretch of desert extends from north-western India to the west coast of Africa—an area considerably larger than the U.S.A. The great Sahara has induced many to assign the climate as of the "Sahara type".

The desert climate is characterised by aridity. The real significance of the desert is its unproductiveness and its consequent inability to support settled self-dependent communities. The main cause of aridity is the distance from the marine influence, hence the continental interiors are especially dry. But in evaluating distance from marine influence the prevailing winds, their direction and their constancy must also be taken into consideration. Thus the deserts extend down to the western shores in the trade wind belt but in the belt of less constant Westerlies they do not extend to the eastern shores. "Hot deserts are typically continental, with dry air and a huge diurnal range of temperature and a considerable annual range".

The greatest deserts in the world occur beneath the Horse Latitude highs: the Sahara, Arabia, Australia, Kalahari Atacama. These are great trade wind deserts, covering an enormous space of the earth's surface and doomed to backwardness on account of their aridity. Because of the difficulty of crossing them they present one of the most significant barriers of race, creed and civilization to be found on the earth. Because of their unproductiveness and harshness of the environment they must be inhabited by nomadic people of great independence and strength of character, self-reliant, proud and lawless. The desert is the stronghold of Mohammedanism, the simple, rigid and severe creed of a monotonous stern environment.

The annual range of temperature is not very great (30 or so), but the huge diurnal range conveys a very inadequate picture of the true climatic conditions. The dry air and the cloudless sky offer no obstacle to the passage of the sun's rays, so that by the afternoon the temperature generally rises above 120 and sometimes above 130. After sunset the heat is quickly lost by radiation and the temperature falls as rapidly now as it rose in the morning. The nights, even in the summer, are distinctly cool and in winter frosts occur. Thus the daily range of temperature is great (25 or 30) and often excessive. Due to excessive heat, strong convection currents result in strong, though variable winds which whip up the dust and bear it along in clouds. These are sometimes local swirls—dust devils—but sometimes are connected with cyclonic storms. These are as a swirling rush of scorching air laden with dense clouds of blistering sand through which it is impossible to see more than a few yards.

The prevailing winds, having come over wide stretches of land, are normally very dry. Under the low relative humidity the evaporation is often twenty times the rainfall. At such a time the temperature rises over 100 and the heat and dryness are most distressing; skin and finger nails crack, the hair is brittle and electric and the whole body seems desiccated. Hardly there appears any cloud in the sky, which is sometimes intensely blue, and often hazy with dust. The night skies are very clear. It is not surprising that the ancient Egyptians and the Chaldeans were well versed in astronomy, that the sun was worshipped as a god and that the star and crescent have been adopted as emblems on their flag. At night the air often cools below the dew point and copious dew may be deposited, but this dew is quickly re-evaporated in the morning. Under such conditions, the rain hardly falls. Sometimes the clouds may be seen from which rain is falling but it does not penetrate far in the thirsty air. The chief rain occurs in the form of heavy storms which break with great violence and suddenness, giving an inch or more of rain in an hour. There is no vegetation to check the run-off and in a few minutes the rains fall with rushing water and farther down unsuspecting traveller may be overwhelmed by the rapidity of the flood. The station selected to represent this type of climate is CAIRO.

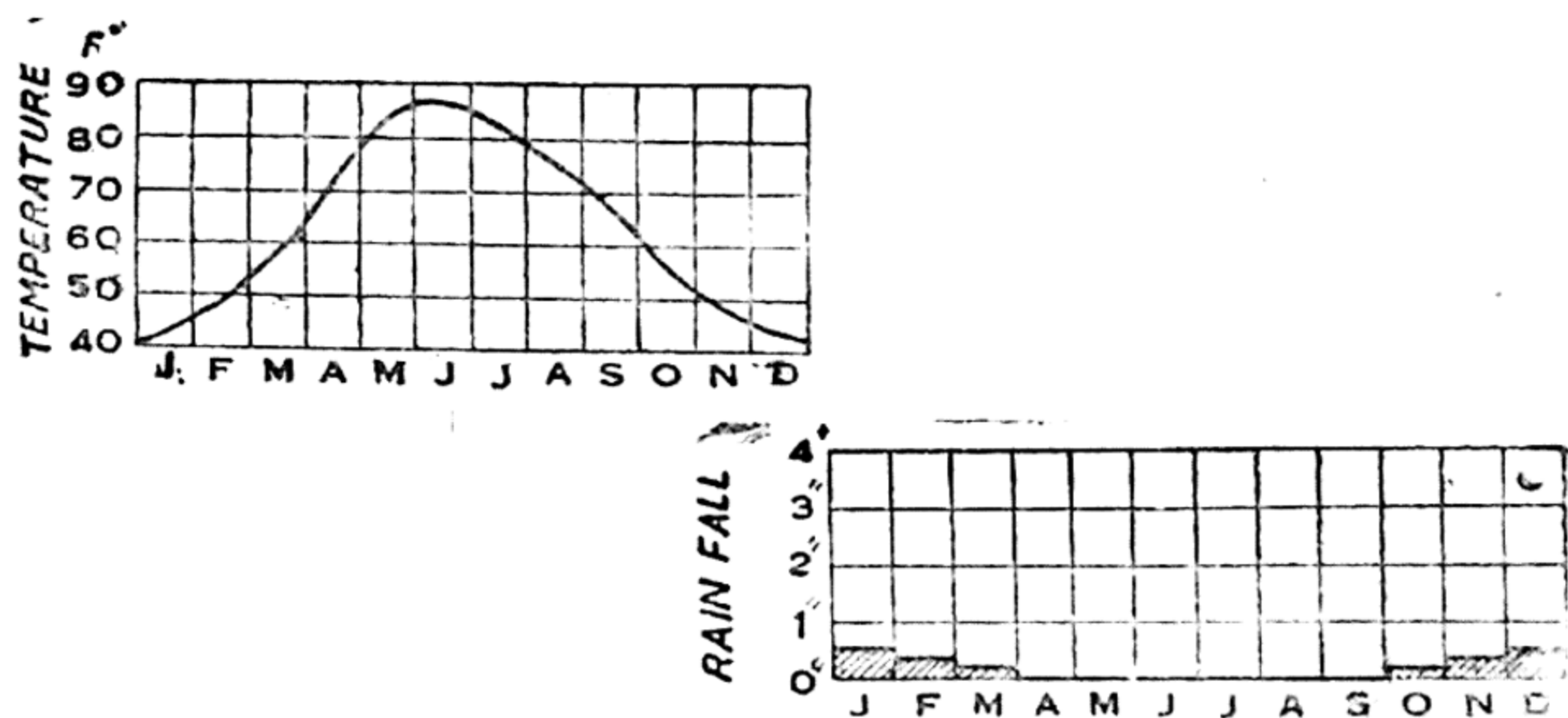


Fig. 6—Hot Desert—Cairo

The desert gradually fades into semi-desert towards the Equator where the annual precipitation is 9 or 10 inches; such a region is really transitional which may be well classed as dry areas of Tropical Grasslands. Where, however, the average rainfall is 20 inches a year, desert conditions totally disappear and in place Tropical Savanna is found. On the poleward margin, deserts gradually merge into the Mediterranean scrubland. The equatorward margins receive their rainfall in summer

and the poleward margins in winter. Cairo with an average rainfall of 1.3 inches a year is typical of the transitional areas.

It is a popular fallacy to associate deserts with complete absence of vegetation. Actually they are not, as a rule, as completely barren as we habitually think them to be. As desert zones are generally taken to include all areas with less than 10 inches of rainfall, and are therefore, not entirely devoid of vegetation since 8 or 9 inches of rain will support a thorny scrub or rough pasture. The desert vegetation consists entirely of plants that have to withstand long periods of drought. Some species for the purpose have extremely long roots which penetrate to quite abnormal depths in order to reach water; others store up water in special stems and leaves. In deserts chiefly two types of vegetation are found. Dry grasslands which intervene between the desert and the tropical grasslands and the scrublands lying between deserts and the Mediterranean regions. In places where ground water comes near the surface there are oases, which show clearly how fertile the desert soil is when water is available. In these oases, date palms flourish, and a great variety of products can be grown, such as cotton, rice, sugar, vints, tomatoes, tobacco and fruits.

Animal life is not abundant in desert regions. Yet certain animals have adjusted themselves well to desert conditions. The camel is by far the most useful to them. Another useful animal is the goat. Lions and antelopes are also sometimes found to forage in the desert lands.

The deserts, as can easily be imagined, are very sparsely populated but an oasis often contains a large population because, no doubt of its fertility. The desert people are commonly divided into three groups according to their occupations and the stages of development. (a) The namads, who are always on move with their animals and scanty belongings. They are said to be hunters, robbers, carriers, and stock-raisers, all in one. They often act as carriers of goods from one desert border to another and keep the desert trade moving.

(b) Cultivators who live in natural oases or other irrigated areas. Since certainty of dry weather ensures successful harvests and winter temperatures are high enough for the growth of temperature crops, cultivation reaches an advanced stage. The drier borderlands of the oases are utilised by pastoralists who rear sheep, goats and the camels.

(c) Recent immigrants who, lured by minerals and the possibilities of quickly acquiring wealth, face the obvious privations due to scarcity of water, lack of timber, shortage of herbage for animals and want of transportation facilities. Yet the

nitrate fields of Chile, the copper and diamond mines at Kimberley in South Africa and the gold mines of Western Australia, all attract people to brave all dangers, and they have actually done their utmost to overcome them.

MONSOON REGIONS

The tropical monsoon regions are restricted for the most part to the tropics. The typical monsoon lands are India, Indo-China, and Southern China; Central and Northern China and Japan, may also be grouped under this category, because their rainfall is caused chiefly by the monsoon winds, but these regions lie outside the tropics, and have distinctly cold winters unlike the typically monsoon lands where winters are warm. The monsoon climate prevails in the island of Madagascar, in a small part of the East African coastland, and in the north-west coast of Australia. In a modified sense, again the coastal areas of the north-west of South America and Central America may be said to have a monsoon type of climate.

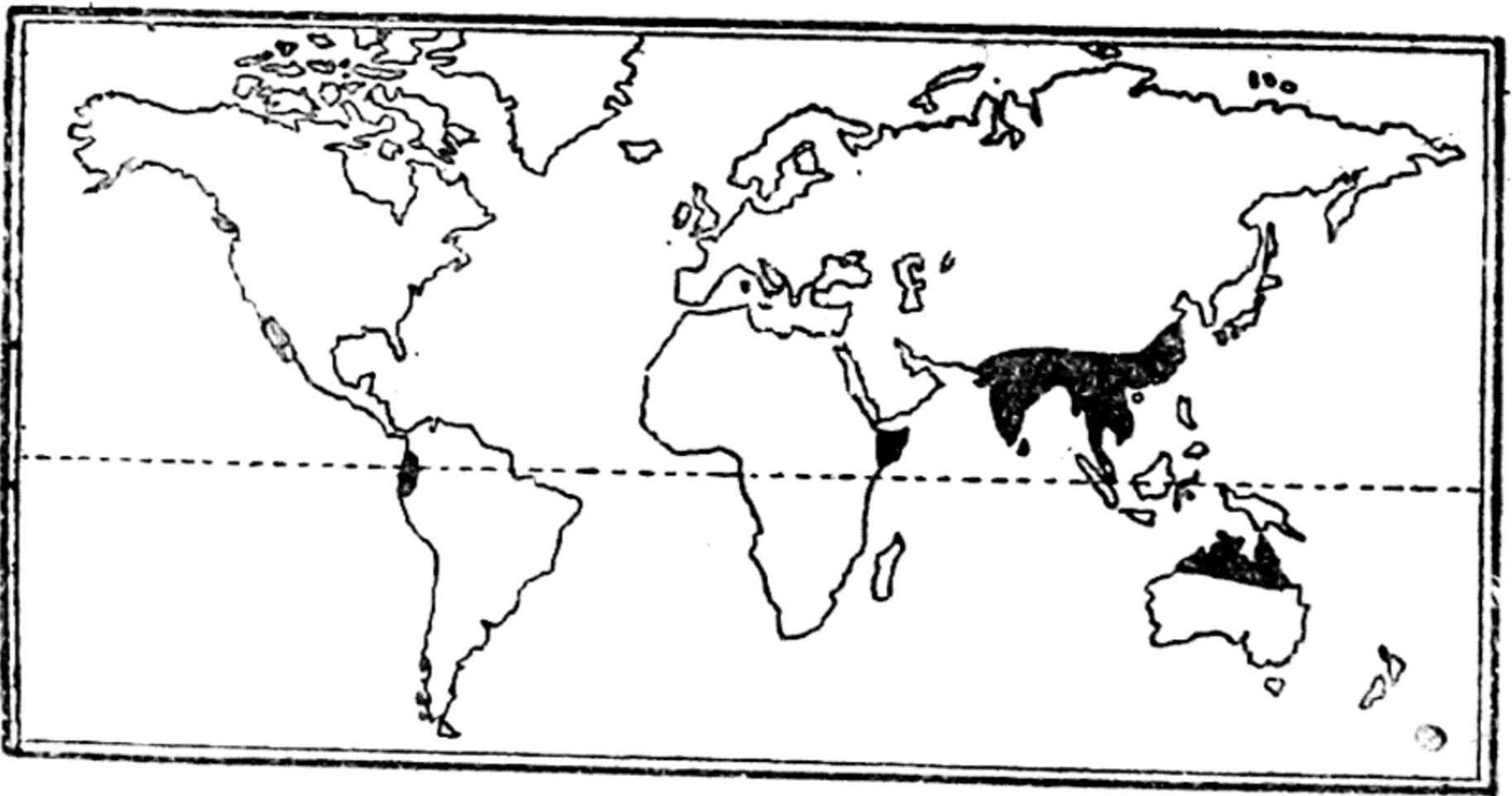


Fig. 7—Monsoon Regions

In true monsoon lands the winds are seasonal. In winter, monsoon lands are under the influence of normal trade winds. In early summer the situation of the regions, on the fringe of the great land masses, causes the land to be greatly heated. Thus the low pressure in summer leads to several of the Trade Winds. Moist and cool winds from the sea are drawn towards the land, and they bring heavy rains. Hence the tropical monsoon regions are lands of heavy summer rainfall. The winters lasting from November to January, have very little rain. It rains till October. The rainfall in monsoon lands depends largely on surface relief. In true monsoon areas the year can be divided into three seasons:—

- (1) October to March, the cool, dry season.
- (2) March to June, the hot, dry season.
- (3) June to October, the hot, wet season.

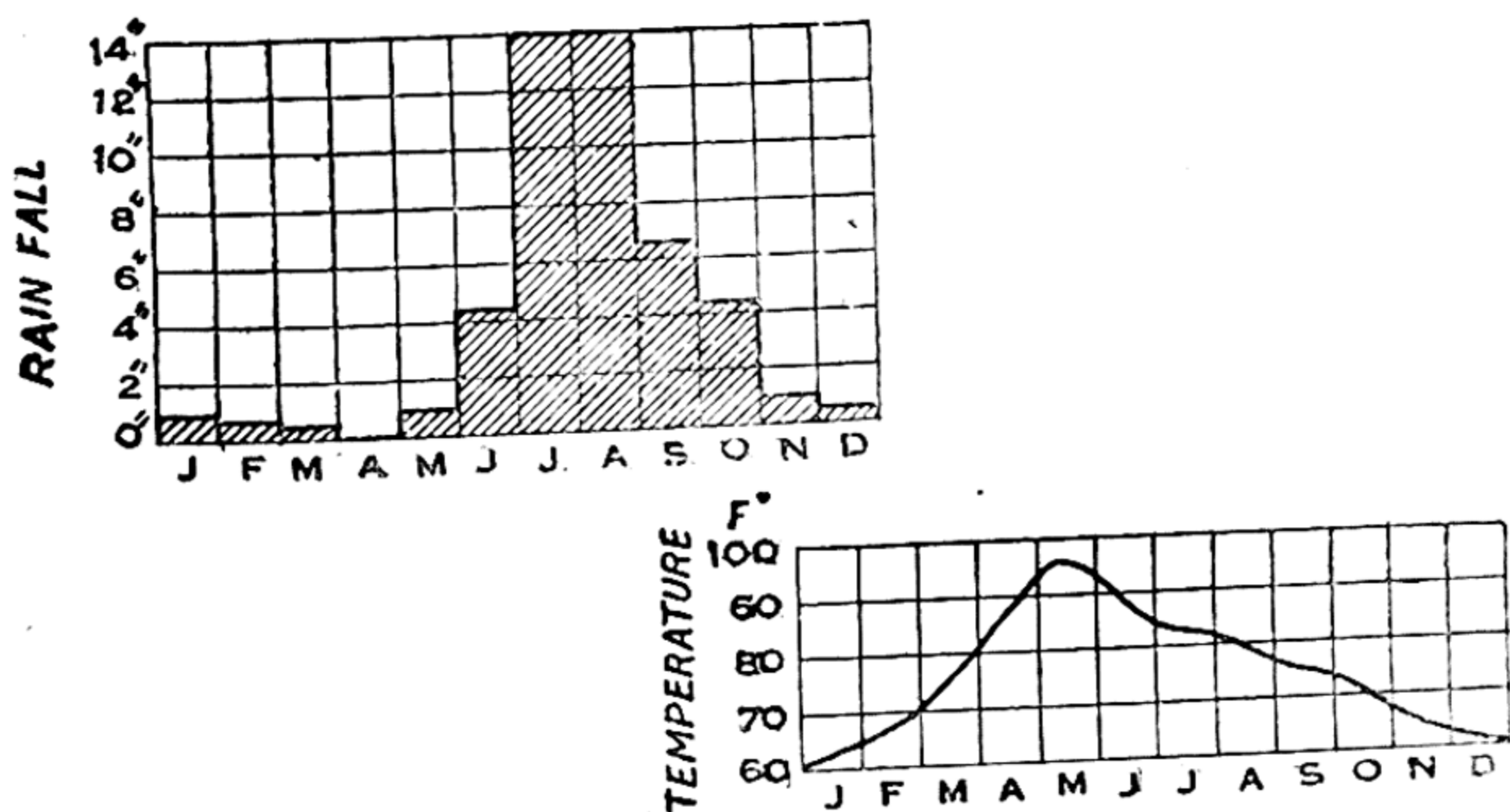


Fig. 8—Monsoon Type—Allahabad

The vegetation of the monsoon areas varies with the amount of rainfall, where the rain is very heavy, i.e., over 80" there are the regions of the evergreen forests closely similar to those of the "Rain Forests". Rice is the chief food crop of these areas. The areas of heavy rain 40" to 80" produce a rich, deciduous forest (teak, etc). Here also rice is the main food crop; but maize, sugarcane and oil seeds are important. These areas of moderate rainfall 20" to 40" only support a kind of grassland and thorn scrub, millet is the chief food crop, but where conditions are favourable wheat and barely are cultivated as winter crops. Sesamum and oil-seeds and cotton are other notable products. While in areas of deficient rainfall, i.e., below 20" there are found deserts or semi-deserts, in which species of succulent plants are sometimes seen.

The monsoon lands are amongst the most densely populated areas in the world. This is due to a large number of causes—sociological, political, historical and otherwise. The chief geographical cause, however, seems to be the ease with which forests can be cleared and crops substituted in their place, the greater facilities for cultivation and the easier and richer conditions of living. Where the soil is the richest the land may be said to be 'saturated' with people as is in the Gangetic plains of India. Speaking as a whole, agriculture forms the major occupation of the people in the monsoon lands.

MEDITERRANEAN TYPE

This type has only a limited extension on the western margins of the continents, except in Europe where the Mediterranean Sea extends its range for 2,000 miles into the heart of the land. The climate degenerates into the Steppe and desert with the decrease in winter rainfall. Equatorwards the winter rains begin later and later and cease earlier and earlier until there can scarcely be said to be a wet season at all.

These regions lie outside the tropics and are situated on the western margins of the continents roughly between the latitudes of 30 and 45 both north and south. Besides the lands surrounding the Mediterranean Sea, (S. Spain, S. France, S. Italy, Greece, Asia Minor, and N. Africa), California in North America, Central Chile in South America, the south-western parts of the Cape Province in South Africa and the south-west of Western Australia belong to this group.

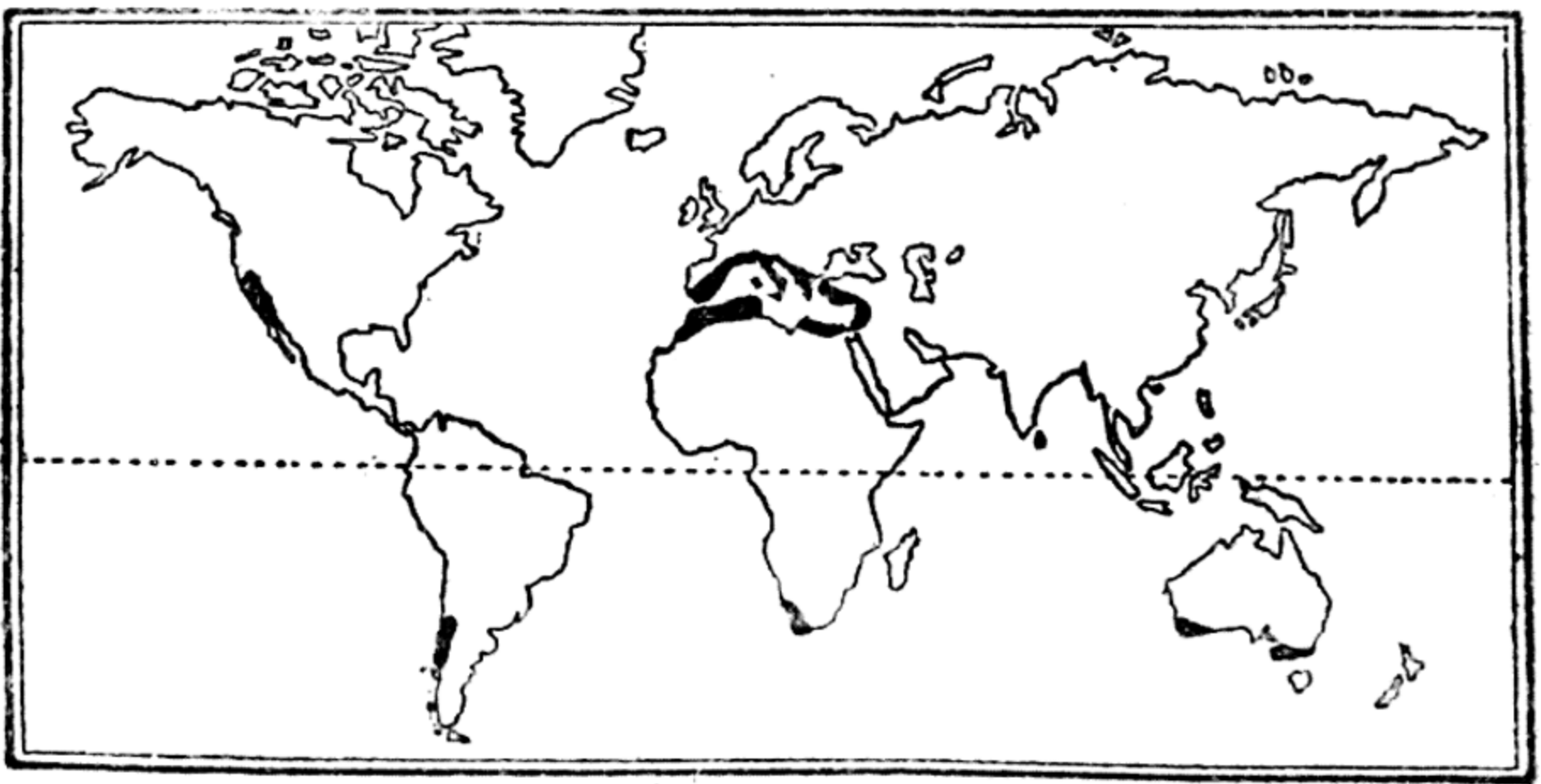


Fig. 9—Mediterranean Region

The Mediterranean regions lie wholly in the Temperate Zones, so they are, as a rule, cooler than the tropical lands. But considerable local variations are found in different parts. The mean temperature of the coldest month is usually between 43 and 50 and of the hottest between 70 and 80, the range of temperature ranges about 30. This range increases with the distance from the sea. The highest temperatures are recorded at the eastern end of the Mediterranean farthest way from the Atlantic influence.

Forests are unknown on the oceanic islands and are rare on the small islands of the Mediterranean. The rarity of forest encourages the cultivation of delicate fruits, especially citrus fruits.

The daily range of temperature is considerable, 10 or 15 in winter and 15 or 20 in summer. In such a climate houses are provided with shutters to keep out the heat and glare and the design in general aims at coolness in summer rather than warmth in winter. There is often a breeze to temper the heat, especially near the sea or mountains where sea breezes begin to blow about midday or where valley winds occur. The heat is dry and not so invigorating as the moist heat. The mixed fall in temperature after sundown causes a feeling of chilliness. It also brings about a great increase in the relative humidity, dew is copious and heavy mists occur, which quickly melt away before the rays of the morning sun. Rheumatism and pneumonia are very prevalent.

Rainfall in the Mediterranean climate is usually associated with the passage of cyclones and its seasonal incidence corresponds to the equatorward migration of months. Orographic rains are frequent where rain bearing winds are intercepted by the mountains. The yearly amount of rainfall varies from 15 to 35 inches, but the westward facing shores may even receive as much as 50 inches or more. Generally rain decreases eastwards, far away from the oceans, and equatorwards away from the cyclones.

Rainfall comes mostly in the winter months. That is why, these regions are also known as the "Regions of Winter Rains". Dry summers and wet winters are the chief characteristics of these regions. Owing to the annual migration of the thermal equator, the Mediterranean lands come under the influence of the dry Trade Winds during the summer months. The same reason causes them again under the influence of the Westerlies in winter. Since the dry trade winds blow off shore in summer, the Mediterranean regions receive no rain throughout the season and receive their due share of the moisture in winter from the Westerlies which blow inshore this time. The rainfall varies from 40 inches on the poleward side to 10 inches on the desert side. The poleward side areas usually have one summer month without rain, as in South France, but on the desert borders there may be as many as seven dry summer months as in Tripoli. The example selected to illustrate this type of climate is ROME in Italy.

Though winter is the rainy season yet is by no means cloudy or damp. Storms are rare but whenever they occur, they bring heavy rains. These lands are famous for their blue and cloudless skies, they are the sunniest parts of the world and are naturally suited to the health and pleasure resorts of every continent in which they occur.

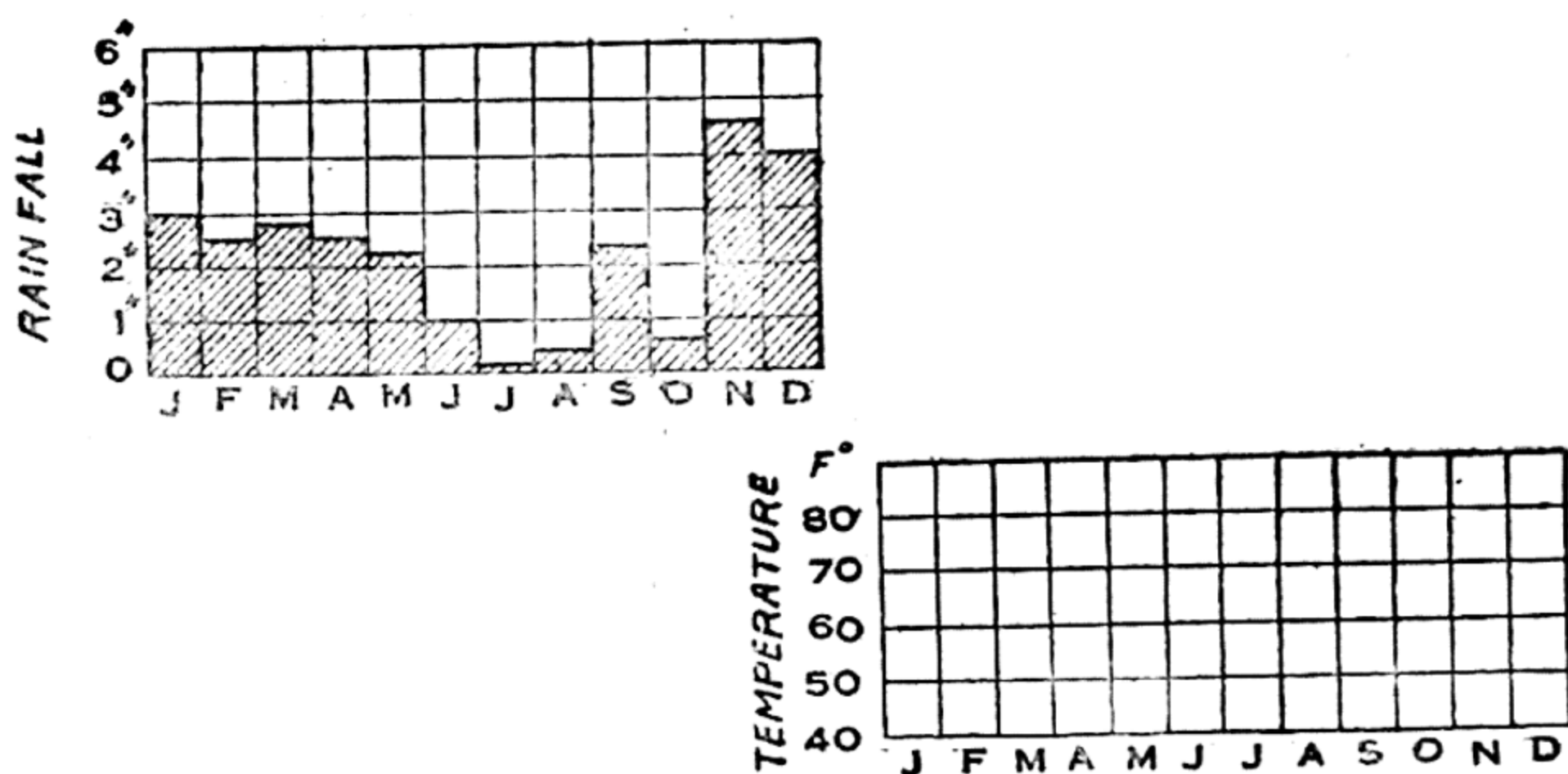


Fig. 10—Mediterranean Region—Rome

Like climate, the vegetation is well applicable in case of this climate. As the summers are hot and dry the plant life therefore is dominated by the drought-resisting type. Since the plants must protect themselves from the lack of moisture in summer months, shallow-rooted species, requiring rains in the spring and summer do not flourish. Trees and shrubs which can survive by retaining moisture for the use in the dry season do, therefore, only persist. Most of these have developed special devices for holding moisture. Some plants like the vine have long roots to suck water from the underground, olives have leaves provided with fine silky hairs to prevent excessive evaporation, a few other species have leaves with coating of wax or have thick bark with pointed pins to prevent rapid transpiration. Surface vegetation of these regions are the various species of flowering shrubs and herbs which generally take the place of grass. Among the shrubs myrtle, laurel, and oleander are important, while bulbous and the maquis flowers are characteristic of these regions. The maquis have earned for Corsica the name "Scented Isle".

Where the conditions are less favourable the forests degenerate in low scrubs, consequently the macquis of the Mediterranean, Chapperal of California, the Mallee scrubs of Australia grow. Where the supply of moisture is abundant, fine forests grow, and the chestnut, cork oak, and pines, cedar and olives occur luxuriantly.

Cultivated plants include various cereals—wheat, barley, and a large variety of fruits. The fairly long dry summer with bright sunshine for the greater part of each period of 24 hours

is said to be ideal for the ripening of fruits. There the production of oranges, lemons, grapes citrus fruits, peaches, pears, apples, apricots, olive, almonds, figs, mulberry and vine are all equally abundant. Irrigation has played a large part in the commercial history of these regions because rainfall is generally not sufficient for raising of crops. In the absence of good pastures cattle are rare, their place being generally taken by the less fastidious goat.

The important occupations of the people in these regions are rearing of animals for hides, search for precious metals, e.g., gold in California, growing of fruits and agricultural industries, viz., wine making, fruit drying and the extraction of olive oil. Forests are not exhaustive, therefore, lumbering is insignificant. Here large manufacturing and industrial areas comparable to those of the North-Western Europe, or North-East of U.S.A., have not developed, as coal in these regions is rarely found, industries do not exist in these regions except those relating to the production and extraction of fruits.

EAST COAST OR CHINA TYPE OF CLIMATE REGION

The lands of the mid-latitude east coasts margins, like the Mediterranean lands, lie within the 30th and 45th parallels; but they lie along the eastern coasts of the continents. The Gulf States of the U.S.A., China, south-eastern Brazil, Natal in Africa, and the southern parts of the east Australian coastlands belong to this group; other parts like the north-eastern coastal tracts of the U.S.A., parts of East Canadian coast lands, Japan, and Manchuria are also often associated with the former group.

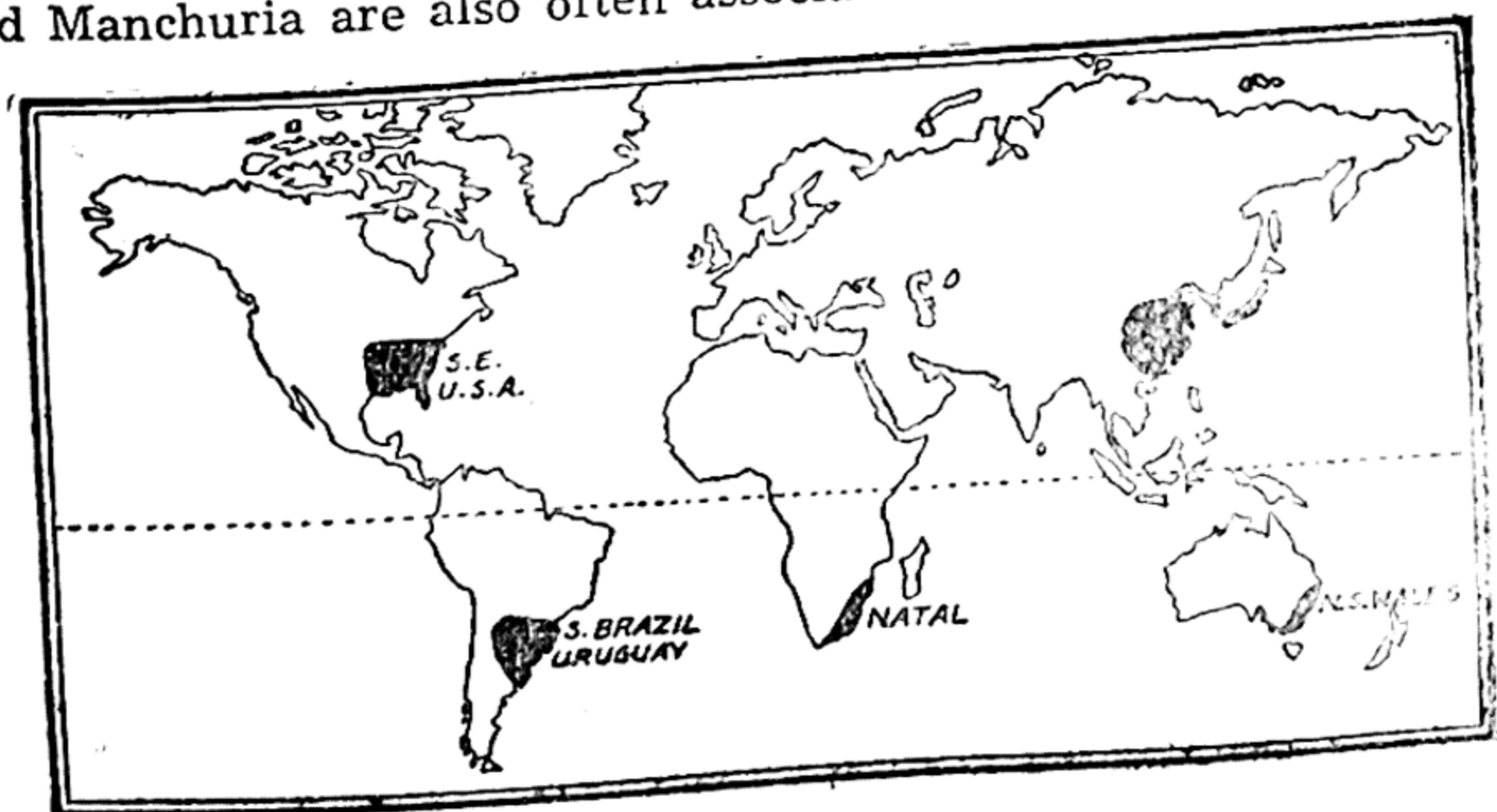


Fig. 11—China Type

The transition zone between the trade wind westerly circulation is found on the eastern margins of the continents in the climate, where winter rains are relatively less and summer rains generous. Tropical storms are more frequent, e.g., the west Indian hurricane and the Chinese typhoons are frequent visitors to the U.S.A., and China and Japan. They may bring havoc at times destroying everything in their way. In winter the sudden eruptions of polar air lower the temperature by 30 or 40 damaging fruit crops. Such polar winds are Southerly Bursters of New South Wales, the Pampero of Argentina and the Northers of the Gulf Atlantic states. Their arrival is sudden and squally and is often accompanied by violent hailstorm and thunder. Contrary to this, the equatorial air bring spells of unpleasant hot weather during the summer months, e.g., the Brickfielders of Victoria may raise the temperature to 120. The Zonda of Argentine is a hot moist wind which brings a feeling of complete prostration having the body an easy prey to disease and the mind in a state of dejection. In South China, their temperature is raised by Foehn.

Winters are mild, and the mean temperature being about 50. Frosts though rare, occasionally occur, especially inland. The temperature rises steadily as the sun rises higher, the spring temperature is usually between 70 to 75 in the southern hemisphere, but from 75 to 75 in the continental northern hemisphere. The summer heat is oppressive as the humidity is high. The summer heat is oppressive as the humidity is high. The temperature even rises above 90, reaching even to 100.

The rainfall is adequate, being well distributed over the year. The winter rain is chiefly of the cyclonic type, occurring as light showers or prolonged drizzles, the summer rain on the other hand is either orographical or instability rain, occurring as heavy downpours so that often an hour of rain produces as much as a week of winter type. Much of the summer rain is, therefore, uselessly drained away, while the winter rain possesses a high degree of efficiency. The rainfall is moderate to heavy generally between 30 to 50 inches annually. The station selected to illustrate this type of climate is HANKOW in Central China.

The chief vegetation is tree ferns, bamboos, lianis, magnolias. The regular rainfall supports a forest vegetation which is usually broad-leaved evergreen but sometimes deciduous. Many commercial timbers are found, e.g., oak, maple, walnut, hickory and tulip wood, while mulberry and tea grow as abundant crops during the long moist summer. These climates are suitable for agricultural and horticultural crops and as such

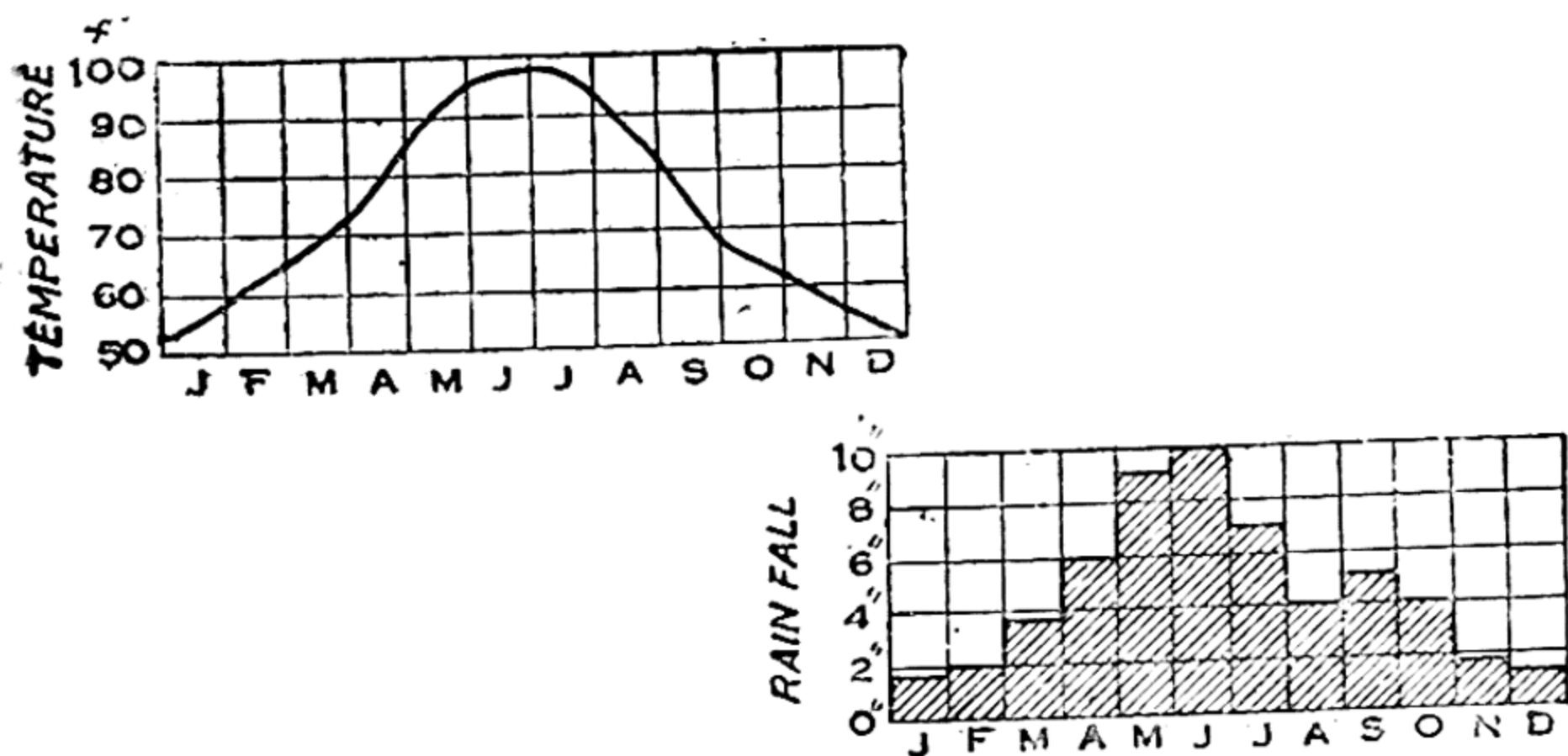


Fig. 12

valuable crops of tobacco, cotton, maize, rice, tea, sugarcane and oranges are widely grown.

The chief natural vegetation is the luxuriant deciduous forests on the low lands and conifers on the high lands, as in the Appalachians, the Blue Mountains of Australia, the pine forests of southern Brazil, and the Drakensburg Mountains in South Africa. The forests include many types of trees similar to those of more northerly latitudes, *e.g.*, beech, and oak, and in addition, magnolias, camelias and camphor trees, etc. There are also tree ferns, small palms, bamboos, and a rich variety of flowering shrubs. The variety and richness of flowers and denser undergrowth are the main differences between these forests and those of the cool temperate of deciduous forests such as are found in Britain. Many of the trees and shrubs are highly important for commerce.

The development of these lands dates so far back that it is difficult to trace it. These lands, by nature, were forested and extensive forests still remain but these areas have never become important for lumbering. On the cleared forested areas agriculture is widely practised, which varies according to the available labour supply and the nationality of the settlers. Such as in U.S.A., where there was abundant slave labour cotton, tobacco, rice and sugarcane are principally grown. The Gulf States of U. S. A., have been aptly described as the "world's storehouse of cotton". In Natal similar hot crops like sugar, rice, tea, pineapples can be grown, because available labour includes not only Negroes, but Hindus and Chinese. In the South American region which does not include Uruguay and southern Brazil, the occupations are mainly pastoral, including the rearing of cattle, horses, and sheep. Now vine, sugarcane, maize, and bananas are being grown in limited areas. In Coastlands of

New South Wales there is no coloured population, and the agriculture is of temperate variety. Dairying and mixed agriculture occupy a large percentage of land. Fruits and other crops are grown in the extreme north.

The development of the industries in these regions, with the exception of southern Japan, is quite insignificant. Manufacturing industries are making a good headway in the south east of U.S.A., but in other areas industries are comparatively few, and those that do exist are based on agriculture.

WEST MARGIN TYPE OF CLIMATE REGIONS

This type of climate occurs mainly on the west margins of the continents under the influence of the west wind belts. As such it is known as the West Margin climate. The whole of Atlantic seaboard of Europe—south-west Scandinavia, Denmark, British Isles, Western Germany, Holland, Belgium, North Spain, western France, the north-western Pacific sea board of North America, British Columbia and the state of Washington belong to this type. In the southern hemisphere, Southern Chile, Tasmania, and south Isles of New Zealand also enjoy this climate.

As it is mostly found on the western part of Europe, it is known as West European type of climate. Since the regions lie in the poleward sections of the temperate zone, and are in the closest possible proximity of the oceans, the climate prevailing in them is often called the "Cool Temperate Oceanic" climate. It may be noted here that these lands have varied surface features. While most of the European lands are plains, British Columbia, Chile and south Isles as well as Norway in Europe are all mountainous countries.

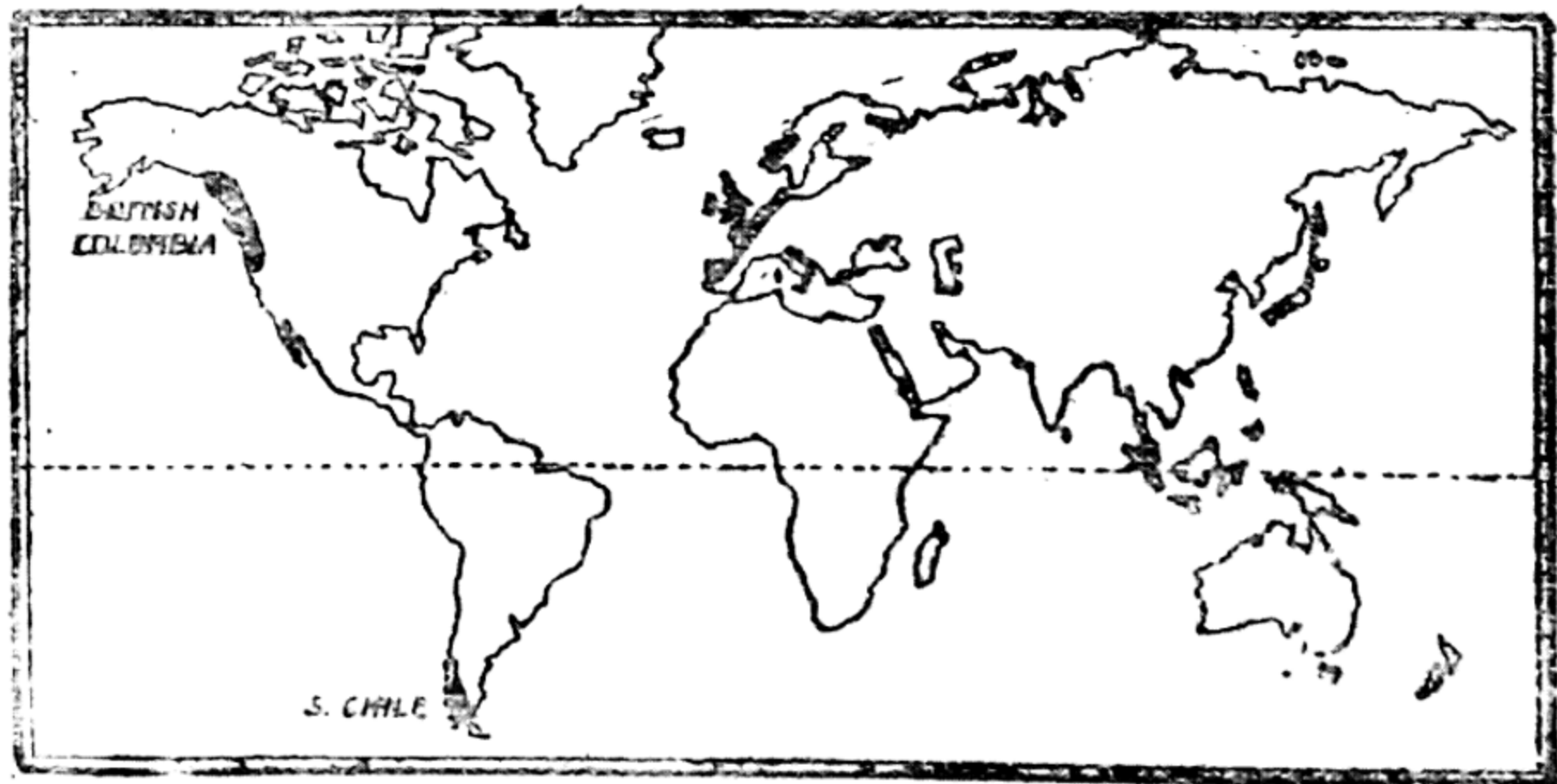


Fig. 13—West Marginal Type

Since these regions lie in the belt of Westerlies, rainfall throughout the year and small seasonal range of temperature are the chief characteristics of the climate. Summers are cool, winters mild, and rainfall fairly abundant throughout the year. The average temperature remains 45 in winter and 70 in summer. The range of temperature is never too great. The climate is never too great. The climate is equable as both the heat of the sun and the cold of the winter are moderated by rain. The climate is, therefore, maritime. The rainfall is throughout the year with an annual average of 70 to 80 inches. Nearly all the rain comes in the form of gentle drizzles and it is more in the western parts where the mountain slopes face the prevalent winds and decreases gradually towards the east and the range of temperature shows a tendency to increase from the coast inward. Snow falls occasionally for a month or two in winter but seldom remains long on the ground. Fogs are common on the coast which are taken inland by the winds. Cyclonic storms occur in autumn and introduce great deal of instability in the weather. The regions are not favoured in the matter of sunshine. On the whole the climate is oceanic and hence equable. The town selected to illustrate this type of climate is VALENTIA in south-west Ireland.

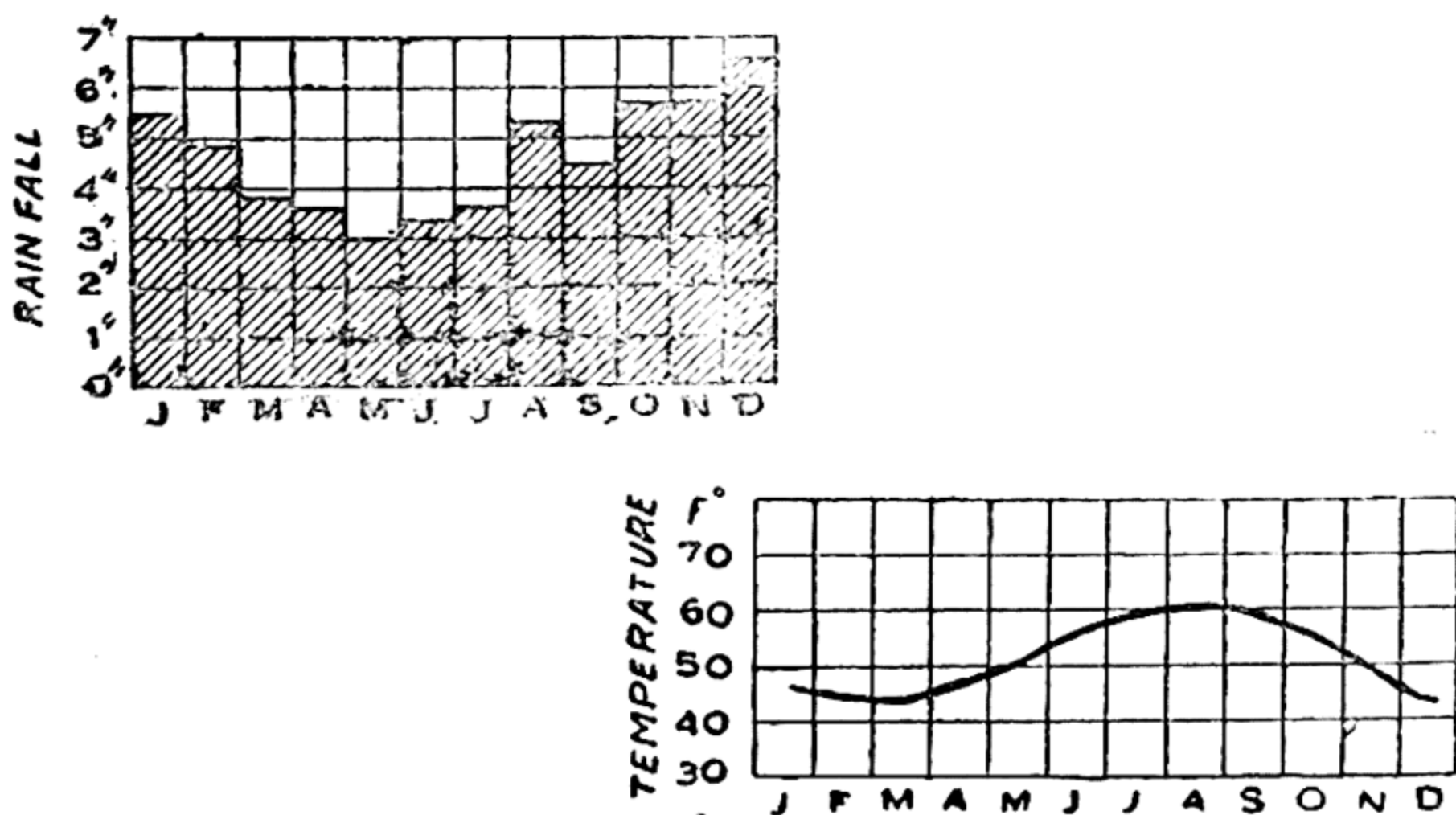


Fig. 14—British Type—Valentia

The natural vegetation of region consists of the deciduous forests. They yield valuable hardwood timber. The commoner trees are the oak, beech, ash, hemlock, poplar, horse chestnut, elm and lime and maple and the smaller shrubby trees such as willows, aspens, alders and rowans which flourish under less favourable circumstances than the larger deciduous forest trees, where the winters are colder the deciduous forests give place to

taiga or coniferous forests. They occur on the higher lands and towards the interior—spruce, fir, larch and pine are the chief coniferous trees. Both these forests yield timber in various forms, wood for manufacturing paper, acetic acid, wood alcohol and wood tar are obtained in enormous quantities.

In many places these forests have been cleared off and agricultural, pastoral and industrial development has taken place so that these regions are among the most civilized parts of the globe. Wheat, barley, rye, oats, sugar-beet, potatoes, hemp and flax are very extensively cultivated except in the areas of high rains. In warmer parts maize is also important.

Deciduous fruits like pears and apples are grown in abundance here. While on the sunny hill sides of France vines are grown and the famous Champagne is manufactured. Rich grazing grounds exist on hills and mountain slopes, and hence cattle and sheep rearing is important. Animal rearing has naturally given rise to dairy industry and woollen industry.

These regions particularly Western Europe, are rich in minerals. Enormous quantities of coal and iron are extracted, which have enabled these regions to develop their industrial sources by starting iron, steel and textile industries, e.g., iron and steel industry in Black Country; textile industry round Lille in France; Iron industry round Leige in Belgium, and Ruhr Basin, ship building of New Castle, cotton and woollen industries of Lancashire and Yorkshire. With the development of steamship navigation, sea is being utilized more and more to open up new markets for these products.

British Columbia in U.S.A., and Sweden, have dissected coasts and fiords with important ports are common and the climate favours the growth of plankton and the consequential abundance of fish; hence fishing is an important occupation of the people.

Economically speaking, these lands in common with the East Marginal lands are called the "Regions of Efforts", where much labour, organisation and thought are needed to ensure to man a comfortable life. Here man is rewarded in proportion to efforts made by him. The climate experienced by the west marginal lands in the cool temperate zone is most favourable to human activity, human occupations being rarely suspended through climatic causes either in winter or in summer. Besides, it is considered by physiologists that the rapid changes of temperature experienced by these marginal lands not only from day to day but almost from hour to hour have a pronounced stimulating effect on the people, bracing their nerves and galvanising them into constant action. The people, therefore, tend to be virile and industrious, and the energy expended by them is

amply rewarded—hence the term “Regions of Efforts” sometimes is applied to these areas.

ST. LAWRENCE OR EAST MARGIN TYPE LANDS

This type of climate occurs on the eastern margin of the continents in the same latitudes as Cool Temperate Oceanic Climate. St. Lawrence basin, Labrador, and Newfoundland, and the New England States of U.S.A., Eastern Manchuria, Amuria, Eastern Korea, and northern Japan consisting of the islands of Sakhalin and Hokkaido in Asia, and South Argentina in South America belong to this type.

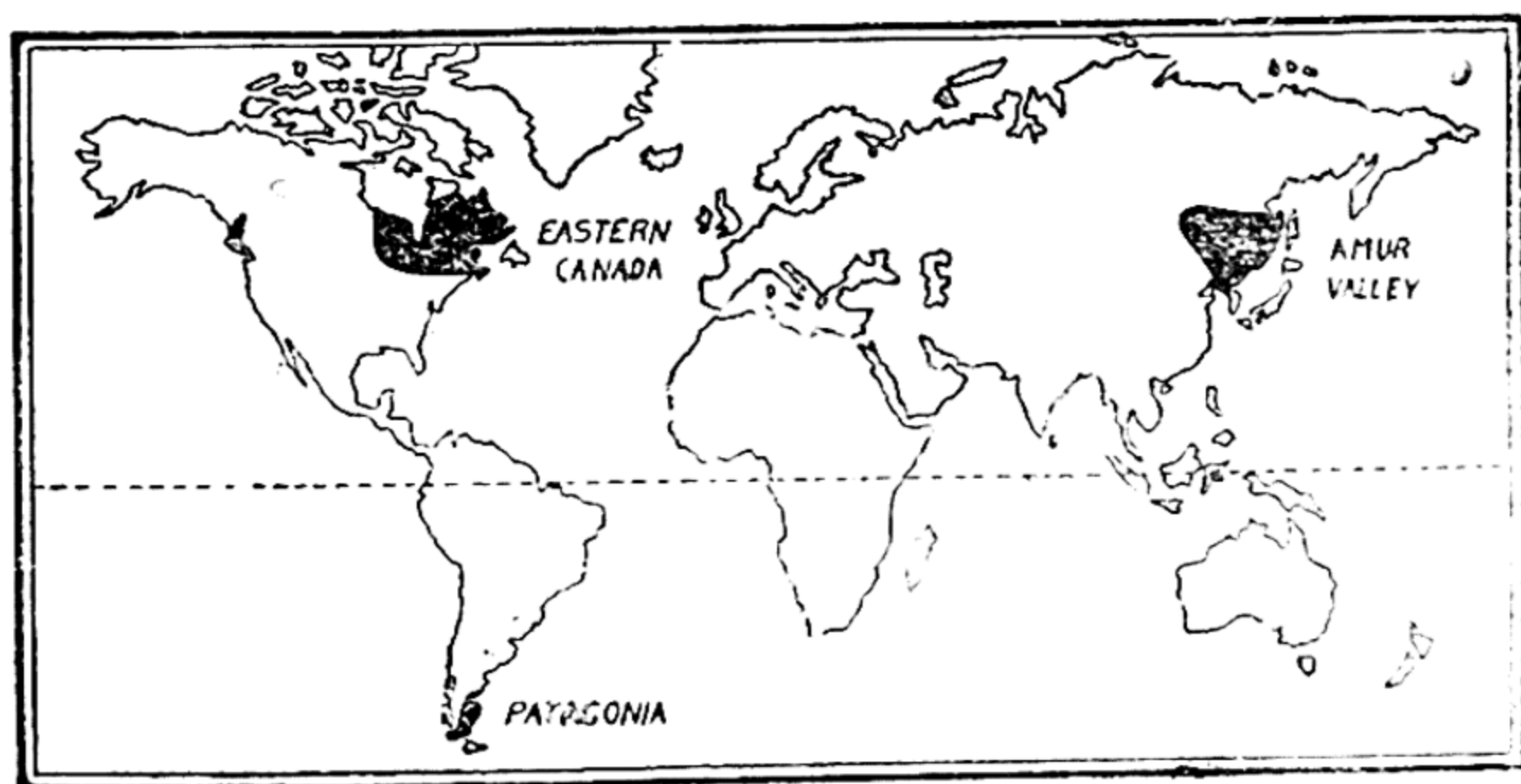


Fig. 15—Lawrence Type

Summers are warm with a temperature of about 65 while the winters are much cooler and the temperature may go even below the freezing point. These lands experience a greater range of temperature than the western marginal lands. The frost-free period is from 150 to 180 days in length.

By reason of their seaward location, these regions get rainfall that is more abundant and more uniformly distributed. In New England States it varies from 45 inches a year in the southern coastal districts to 30 inches in the north. In Southern Siberia, north-eastern Chosen, and the east coast regions of Hokkaido and north Honshiu all have a marked summer maximum of precipitation, and the winters are comparatively dry. These Asiatic regions get their rainfall when south monsoons bring moist warm air from the adjacent oceanic areas. But in west Hokkaido and Honshiu, have a winter maximum since they occupy a leeward position relative to the south monsoons and a windward location in regard to the winter monsoons.

Cold bearing winds from the north chill the atmosphere and winter brings with it heavy snowfall so that abundant snow falls in New England States and snow covers the ground and a thick veil of clouds overcasts the sky during winter in western coastal districts of Hokkaido and northern Honshiu. Hence, the winters are much colder so that the rivers and ocean freezes for part of the year and harbours are closed about half of the year. These conditions are modified by the cold Labrador current along the North American coast and the Kurile current along the east Siberian and north Chinese coast. When the winds blowing from south and south-east in New England states meet the cold current it produces fog. Similarly the warm moist air in the Asiatic land mass creates fog when it meets with the cold current. Thus fogs in these regions are often experienced.

In both the Asiatic and North American regions the winter storm is intense due mainly to the greater intensity of cyclonic storms. But in America they are on a greater scale and more intense whereas in Asiatic regions they are smaller and on the whole less intense.

In contrast to these regions south-east Argentina has less extremes of temperature. The continent of South America tapers towards the south and the influence of sea is therefore felt more in the interior than in the case of these lands lying in northern hemisphere. The Andes check the onshore winds which give rains and moderate the climate. Considerable areas of this country are also dry as a result of the Chinook winds which descend down the Andes.

Vegetation and Economic Activity. Forests of deciduous type mixed with coniferous trees cover the whole land of the Newfoundland, and the Canadian and the New England states land of this type as well as the Asiatic lands. In Argentina conditions are sometimes so dry that large deserts and semideserts are found. Exploitation of these forests and collection of forest produce are the main occupation of the people. In the northern uplands the trees consist mainly of spruce, fir, pine and hardwoods. Since these areas are accessible to the densely populated centres of New England they have long provided raw materials for local industries. Thus lumbering has been an important industry here. Large quantities of spruce are converted into pulp for paper. But at various places forests have been recklessly cut down and this has given place to agriculture. So that now land is extensively devoted to hay, pasture, and tuber roots, oats, rye, barley and peas are largely grown together with grains. Dairy farming is very important in these regions particularly in New England States. Deciduous fruits like apples and potatoes are also grown.

In the Asiatic lands of this type also forests are the chief source of wealth. More or less virgin forests predominate; where the forests have been cleared mixed farming is carried on. Cereals like wheat and barley, soyabeans, kaoling, millets are grown. There occur enormous coal deposits in Manchuria but it has not been developed fully as yet. Pigs are also reared.

In the continental shelves of these regions fishing is largely carried on in country boats.

These regions are called the "Regions of Efforts" because it is the effort of the people that pays here. None of these regions are self-supporting and hence their wants are supplemented by imports of food materials.

Cool Temperate Regions or Siberian Type. The Siberian or the continental type of climate is found in latitudes 45° and $66\frac{1}{2}^{\circ}$ in the interiors of the continents. It is mostly confined to the Northern Hemisphere, the Southern Continents barely reaching these latitudes.



Fig. 16—Siberia Type

This climate has typically developed in Siberia extending along the northern part of Soviet Russia. The central part of Canada also has got a similar type of climate. Distance from the sea and the consequent absence of oceanic influence results in an extreme type of climate. The summers are fairly hot, having temperatures about 73°F , and the winters are definitely cold when the temperature frequently falls even below 0°F . The rainfall is light, averaging about 20", and it falls mainly in the spring and early summer. This rainfall is primarily convectional. BARNAUL in Siberia has been chosen to illustrate this type of climate.

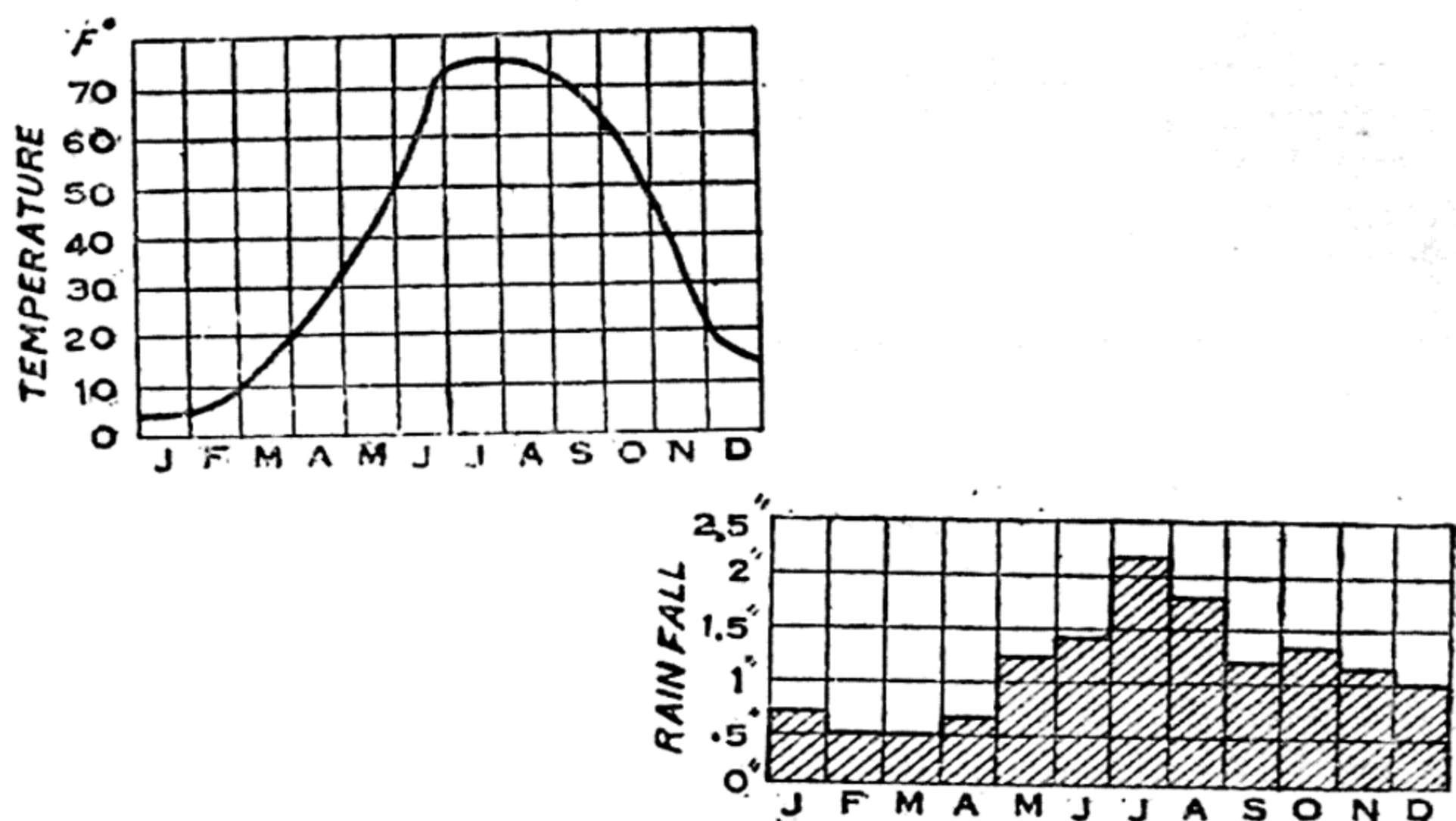


Fig. 17—Siberia Type—Barnaul

The natural vegetation consists of coniferous forests, but in some parts local peculiarities of relief or winds and distance from the sea may reduce the rainfall and cause a poleward extension of the grasslands into the forest belt, as in Alberta and Central Siberia. There are only a few varieties of trees of which the commonest are pine, fir, spruce, and larch intermingled with birches, aspens, and other trees with broader leaves. The birch extends polewards beyond the limits of the conifers. The trees are mostly cone-shaped with painted needle-like leaves to withstand light rainfall, severe winters and strong winds. There is little undergrowth in the coniferous forests. The ground freezes to a depth of 3 ft. to 5ft., and shallow rooted plants would, therefore, perish. The wide stretches of these forests have only 7 or 8 kinds of trees and sometimes over large areas trees of a single kind only are to be found. This makes lumbering easier. The coniferous trees, generally well known in the commercial world as "deal", constitute the world's most valuable reserve of soft wood timber.

The animals of these regions are protected from the cold by thick and multi-coloured fur, which is commercially very important. The chief furred animals are silver fox, the patch fox, the chinchilla rabbit, the mink, and a host of others.

The human occupations in these forest regions are limited. Trapping and hunting of animals for fur, lumbering, and agriculture as far as it is allowed by the extreme climate are practised by the sparse population of the region. Utilisation of the

forest is difficult because of their interior situation and the extreme climate and the difficulty of transportation. Only the outer margin of the Taiga Forest in Siberia having better facilities of transport are being utilised.

At many places agriculture has followed lumbering; facilitated by the clearing made in the forest. In recent years Soviet Russia has paid particular attention to the development of its Siberian lands. Siberia similar to Central Canada remained backward comparatively in pace of progress; partly due to its vast size, its isolation, the lack of capital, the presence of penal settlements, the political difficulties, and the greater attractiveness of other regions. Now the new settlers from European Russia are gradually developing mineral and agricultural industries. Central Canada having the same type of climate as Siberia had an earlier development in the hands of immigrants that mostly came from the progressive countries of Western Europe.

Temperate Grassland or Steppe Regions. Roughly these regions occur in the heart of the continents where a temperate continental type of climate prevails. The prairies of North America and the steppes of Southern Europe and Southern Siberia belong to this group. In the Southern Hemisphere though we do not find similar grasslands, due to narrow land masses and oceanic influences, yet Pampas of South America, the Veld of South Africa, and the Downs of the Murray-Darling basin of Australia are at best included in this group. Temperate grasslands of Southern Hemisphere exhibit certain well marked differences from those of the Northern Hemisphere, owing chiefly to their nearness to the seas.

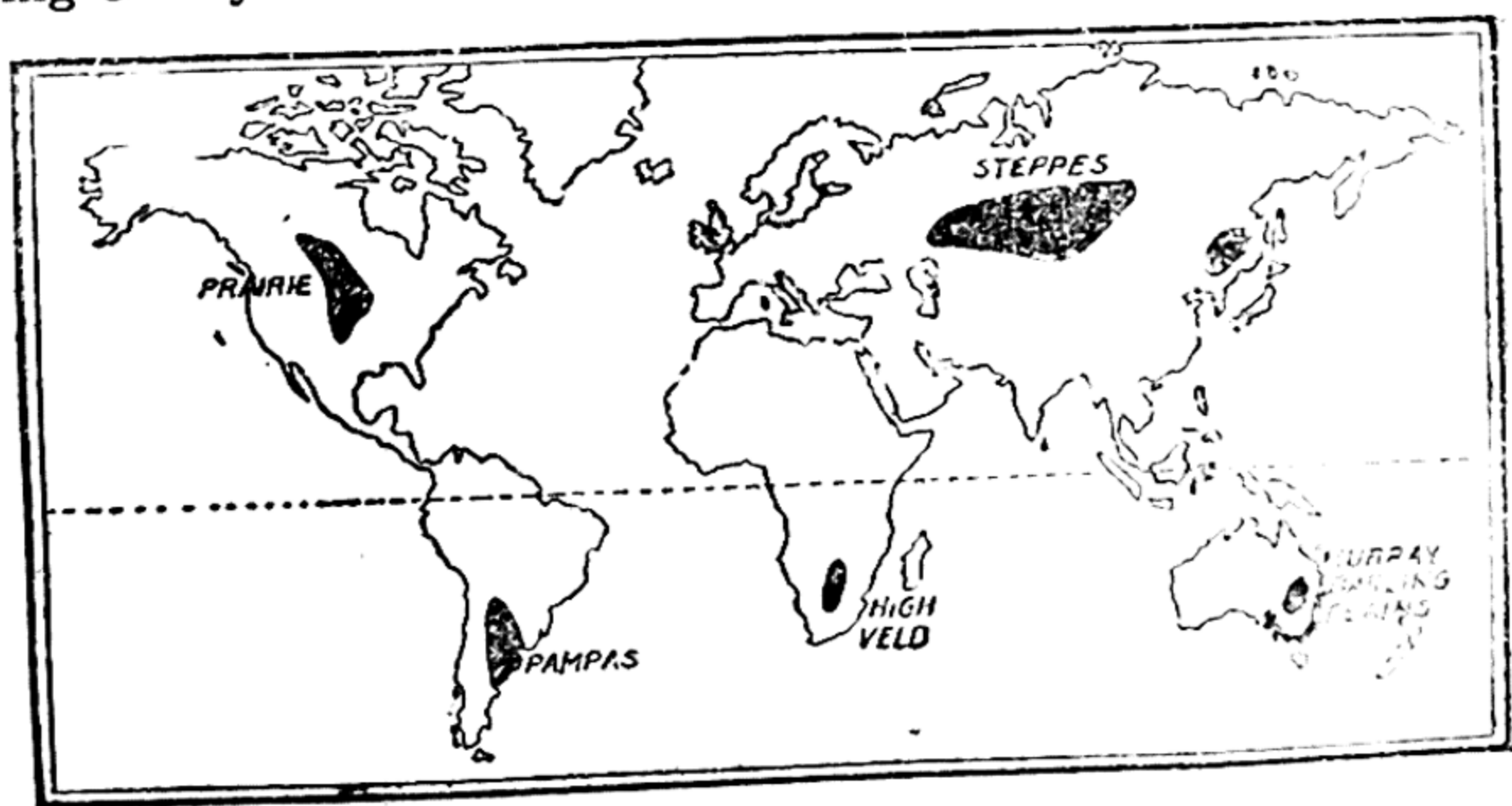


Fig. 18—Steppe Type

The temperate grassland type of climate cut off from the moderating influence of the sea, is characterised by sharp seasonal contrasts. Summers are, therefore, exceedingly hot. The average summer temperate usually ranges between 60° F. and 80° F, sometimes even higher. Winters, on the contrary are exceedingly cold, the average temperature falls below zero. Summers are short, rarely enduring more than three months; and the winters long and severe. In Southern Hemisphere the sharp contrasts of temperatures are reduced by the moderating influence of the sea.

Rainfall comes mainly in the spring and summer season, but is not uniformly distributed. Since various local factors govern the actual amount of rainfall, therefore, exact figures that would hold good for all these regions, cannot be given. In typical regions precipitation varies from 10 to 30 inches. The North American Prairies usually have an annual rainfall of 20" to 40" and even more than 40" in some parts. Almost some figures hold true for Pampas. The Eurasian steppes on the contrary have an average of only 10 inches, and same is the case with African Velds, whereas in the Australian Downs it ranges from 20" to 40". The town selected to illustrate steppe type of climate is BISMARCK in U.S.A.

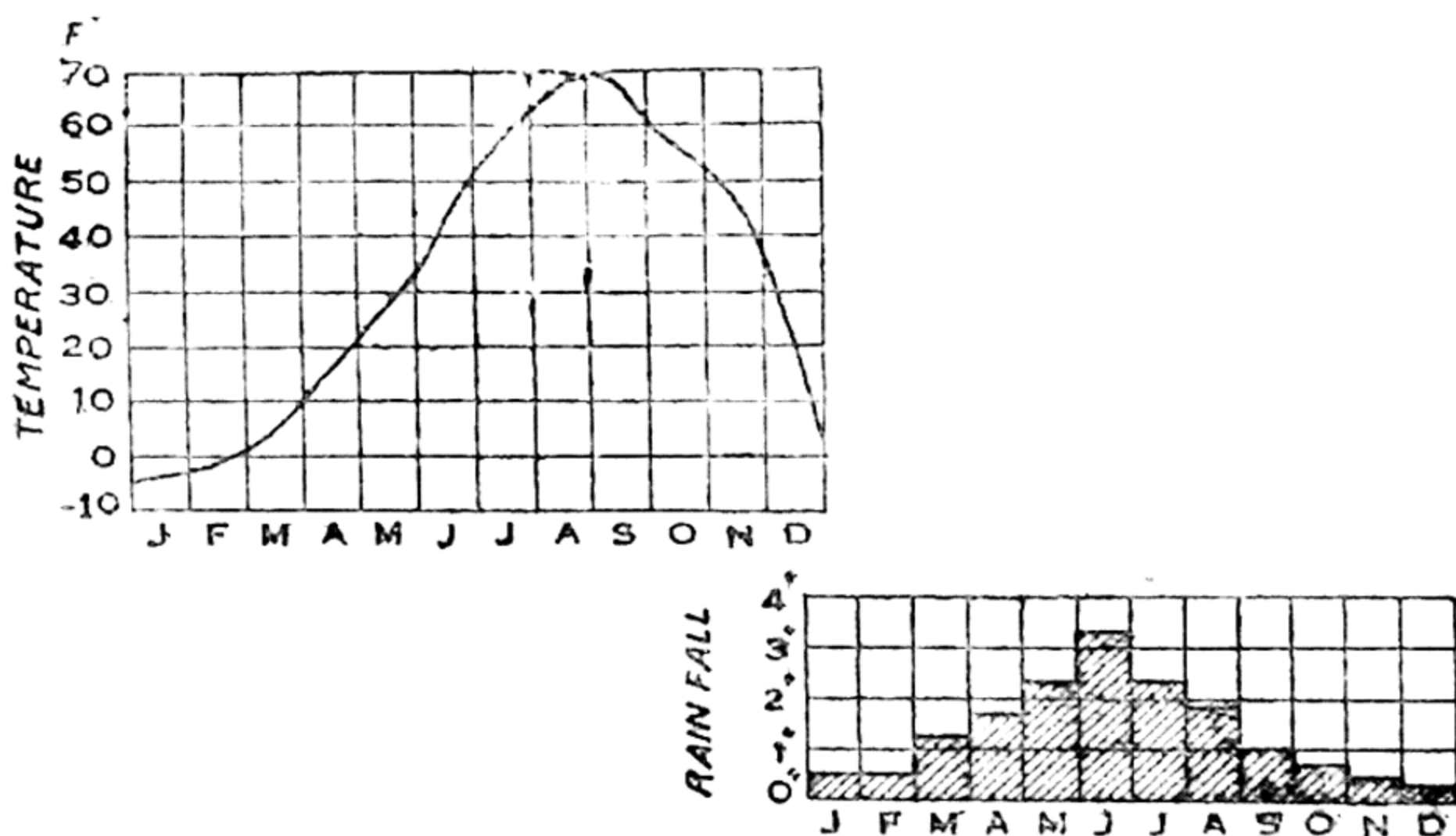


Fig. 19—Steppe Type—Bismark

The native vegetation here is grass. The light spring showers are ideal for the growth of grasses. These grasslands are typical in their own way as that of the tropical grasslands. The distinctive feature of these regions is the absolute treelessness of the rolling plains. This general feature, however, appears some-

what modified in the Australian Downs where a few scattered eucalyptuses are found here and there. The grass is usually short, softer and less coarse than that of the Tropical grasslands.

The animals found here are of two kinds—swift footed grass-eating animals, represented by the antelope, the horse, the bactrian camel, the bison, the kangaroo, etc. and the carnivorous animals dwell upon the former, like the wolf, the wild dog, the coyote, etc., amongst which man must really be included.

The grasslands are chiefly devoted to the grazing of sheep and cattle, because they can subsist on short grasses and are capable of standing periods of drought and the long winters. Cattle are concentrated in the water parts, as for instance, in the Argentine and Uruguay. Agriculture is also making headway rapidly in these regions, aided as it must be by irrigation. Only the arid regions of Mongolia and Manchuria still lie more or less undeveloped. The chief crop is wheat, except in African Veld, where maize is of prime importance; next in order come barley, oats and rye. Thus the temperate grasslands have become the world's granaries from which the deficiencies of the industrial countries are made up. Population here is very scanty, therefore, exports are great. Industrially these are backward, a few industries related to agriculture, such as manufacture of cereal foods and starch; the canning of meat; the making of meat extracts; all forms of leather manufacture; bacon curing; refining of lard; and manufacture of margarine, glue, and bone and horn articles, have been developed recently. A more distinctive feature of these regions is their frontier character, therefore many intruders penetrate gradually along the fringes. In all these regions settlement is still in progress.

The Tundra or Cold Desert Regions. These are located roughly within the Arctic and the Antarctic circles. Nearly the whole of Greenland and the adjacent islands, as well as the northern fringes of Canada, Alaska, Scandinavia and Siberia enter into the Arctic circle, and thus constitute the Tundra or Cold Desert Regions of the Northern Hemisphere. In southern Hemisphere the continent of Antarctica falls almost entirely within this category.

In these high latitudes the winters are naturally very long and summers correspondingly short. The sun never sets for some months during the summer and never rises in winter. Such pronounced seasonal conditions naturally result in a corresponding range of temperature. The summers are warm for the latitude except on snow fields and high lands; winters are cold everywhere. And although the records obtained as yet

show that the 'cold pole' of the earth (Verkhoyansk) does not fall within the Arctic region, there is good reason to believe that the winter temperatures of Antarctica are lower still, there is, however, considerable variation of temperature in these regions. Thus in the Arctic areas of North America the lowest temperature yet recorded is—68.F; while the figure obtained in the northern coast of Canada and Alaska is—54.F in mid winter. The Arctic regions of east central Siberia are, however, colder, but the coastal regions of Norway in the same latitude are 40 to 6 warmer than the east central regions of Siberia, due to the warm winds and ocean currents from the Atlantic. In the summer as the sun shines constantly for days together, therefore, the atmosphere remains extremely hot for the latitude: a temperature of 90.F is not uncommon in the lower Tundra and in some places a shade temperature of even 100.F has been recorded.

Precipitation, as in the Hot and Temperate Deserts, is almost non-existent except for occasional snowfalls which at times assume the proportion of snow storms. The rainfall is light and generally less than 10" annually. Most of this rain falls in the summer half year, when the Westerlies are strongest in these regions. In winter, precipitation takes the form of snow, but as it is so cold the snow does not melt. This accumulation of snow tends to give an erroneous impression of the amount of winter precipitation. Even in winter large areas have no snow covering, as a result of the strong winds which sweep the surface quite bare and pile the snow elsewhere into great drifts.

The Polar Regions are too cold for forests. The natural vegetation in the Tundras is moss and lichen, with small bushes and stunted trees near about the coniferous forest belts. Grass and herbs are also not rare. Besides on the sunny south-facing and well drained slopes one finds in summer beautiful carpets of flowers; known as "bloom mats". But the soil, as well as the climate, is almost totally unfit for raising of crops. The richness of summer vegetation, too, has little economic value.

The notable animals of this Region are the musk ox and the caribou or reindeer. Hares and lemmings are also important. Polar bears, wolves and foxes too are found in large numbers. The seal, the walrus, the whale, as well as several kinds of fish and birds are found in the adjoining seas and the coastal lands of both the Polar regions.

Life in these regions, it needs no mention, is as hard as it can be. And yet man has braved the hardships as well as the dangers. The Eskimos, the Lapps, the Samoyedes, the Yakuts are the actual inhabitants of the Arctic regions. But the population is naturally very small. The main occupations of the

people are hunting, fishing, and the tending the reindeer and dogs. The white man has introduced mining and reindeer farming in some places, especially in Alaska. In the Arctic Russia experiments have been carried out to test the possibilities of cultivating the hardier cereals and vegetables, while the presence of minerals suggests further potential development. Furthermore the Russians have established meteorological stations in view of the increasing use of aircraft in these latitudes and efforts are made to maintain, with the aid of powerful ice breakers, a sea route from the Arctic Coast to the Pacific. The Government of U.S.A. have done much for the development of the Arctic region of Alaska. It seems not unlikely, therefore, that these regions have fairly good possibilities in future. But relatively they will remain undeveloped for a considerable time to come.

~~THIS~~ This book is very much
interesting and fully
accomplishes the needs
of 3rd year Geography
students.
It is a great asset,
please do not damage
or tear it.

THANKS

Syed Shamim
3rd yr. student
of A.S. College

CHAPTER 6

OCCUPATIONS OF MAN

PRIMARY OCCUPATIONS

(The occupations of man are many,) and if we consider the occupations of individuals in any region, we shall find a bewildering variety. (Since economic life never stays at one point for a long time and is always in a state of change and development, at different stages of development people make use of different modes of production and apply different instruments of production; therefore, a change in modes of production, due to cultural change, seeks a change in production forces,) adjustment becomes difficult, and economic effort is often thwarted and impeded in the face of disproportionate response of environmental factors. Pressed to logical conclusion, (the economic development of a people must be considered as the result of resource manipulation, and since resource patterns are a creation of physical environment, the changes in the modes of production and instruments of production must take shape in harmony with the characteristic resource patterns of a region. Therefore, among the peoples engaged in occupations, both in *primary* and *secondary* forms of production, a large degree of resource basis of localization is reflected. *Primary industries*, viz., hunting, fishing, herding, lumbering, mining and agriculture, are more or less localized due to the direct association of resources and location, and so long as the resource potential permits, these industries will persist without any serious inclination towards transition. *Secondary industries*, viz., manufacturing and trade, will develop wherever the resources of primary industries and man power offer opportunities. Though the development of secondary industries in modern times depends more on cultural advancement of people than mere availability of raw materials only those regions can be called economically strong which develop their secondary industries on their own bases of resource supply. Though in more complex stages of manufacturing, the location of raw materials and power makes relatively little difference, the availability of human resource and other environment factors assume greater significance.

1. HUNTING AND COLLECTING

Hunting the wild animals and collecting the fruits of the earth for food, are the simplest ways of earning a living. The hunting tribes have the least understanding of the working of nature, and generally do not know how to use the natural resources for the betterment of life. They are always at war with nature, in which they hardly succeed, for they are slaves of their environment. Truly speaking the simple and ignorant peoples,

living in the luxurious zones of the earth, are in hunting stage for long. ✓

Such people do exist even to-day; the *Semong* and *Sakai* of Malaya, the *Pygmies* of the Congo Basin in Africa and also the *Ges* people of Amazon Basin in South America. They are the most backward of all hunting tribes and remain hunters mainly by their simplicity. They live on wild roots such as yams, berries, fruit, etc. These the Pygmies collect in their wanderings in search of food.

The Pygmies only hunt and fish when they are in great shortage of food. They hunt with knives, spears and arrows of fire-hardened wood. At some places they also use blow pipes and poisoned darts. They quarry in usually small game such as squirrels, birds or monkeys. They also fish in ponds and streams with elaborate traps made from creepers, or in shallow water, with spears and dams.

The Pygmies and the *Semong* peoples live wretched and precarious lives in the equatorial forest. Often they live in a state of under-nourishment, with an evening meal of cooked yams or small game. Although most of their foods are eaten raw, they do sometimes roast their meat. Occasionally they hold feasts and perform ceremonies to propitiate forest gods and devils and at this time the Pygmies eat to excess.

The elephant or rhinoceros hunting is a tribal operation, and is the highest achievement of organised efforts of Pygmies. It is of course a hazardous adventure, and there are often casualties. Such large game is skinned and cut up on the spot, and the meat, ivory and bone, carried off to the camp and on orgy of feasting and music follows.

Eskimos living in the rigorous environment often face starvation. Successful hunting is the only means of good living. In the hunting season, when food is most plentiful, the Eskimo is apt to gorge. A social gathering may take place at the end of a successful hunt in one of the larger snow-houses of the village. The meat, which they take may be of walrus or seal. They seldom take raw fish, but they may be boiled complete with heads and tails. Eskimos sit round when they eat and all plunge their hands in a common cauldron.

As a hunter the Eskimo is supreme. He has mastered the art of hunting large animals with the least possible equipment. The seal and walrus the great mammals are of great value to the Eskimos. The hunting of these with their harpoons is a matter of great skill and curiosity. The seal is invaluable to

them; its skin makes their clothes, blubber their fuel, and its flesh, dried boiled, their food. On the other hand, walrus hide is tough and makes good Kayak or summer tents. The ivory tusks make knives and spear-heads, and "the tastiest dish to the Eskimo palate is a slab of fresh walrus flesh in small pieces and cooked in a pot of salt water with the heart and entrails". Polar bear hunt is carried in the early autumn period, when they crawl out of the sea. Though bear flesh is eaten, but animals are chiefly preserved for their fur. In the summer season, when the whole ice-covered landscape is changed into a "a rolling meadow, purple flowers, tall grass and low bushes teeming with growing berries", the Eskimos move inland to collect fresh plant food, to trap hares and wild geese, and to fish for salmon trout, and to hunt the caribon herd.

The *Polynesians* of the South Sea Islands use coconut in a variety of ways. They drink the cool clear juice of the green nut. Ripe flesh is taken with delight and is used as flavouring for other foods. They also make creamy flue from coconut which is used as a paste in yam sandwiches. The coconut palm grows luxuriantly everywhere, near the sea coast of the Pacific Islands, and the people use the fruit to the full. But they also grow other food crops of South East Asia. The yams and taro are cultivated by women in little plots round their houses, which form the staple diet of the Polynesian, as does bread in Europe. Their diet includes variety of fruits, bananas, bread fruit and sago palm in particular. They store both these foods against a shortage, or to be used on fishing expeditions.

Since hunting is unknown and the animals are scarce on the islands, nearly all Polynesians are fishermen. They catch small fish like mackerel and sardines in the warm, clear, coral-reef lagoons, with multiple-pronged spears, or with nets and a baited line. Only one meal a day is cooked, and that in the evening; but a variety of dishes are prepared from yams and taro to coconuts, bread fruits, fish and vegetables. One very interesting flavouring is P 27070 from a sea worm which is collected and dried at certain seasons. Pigs are the only large, semi-domestic animals which are common, and like the bonito, they have a religious significance which limits their use to certain seasons. A roasted pig is the festive dish for ceremonial occasions.

The *Melanesians* do not smoke tobacco, but they chew betels which is a stimulant and a food. The Negroes of the Congo forests chew Kala nuts while coco and tobacco leaf are used similarly by the Amazonian people. On the East African Great Lakes plateau the two economies exist side by side without mixing, but with a certain advantage to the diets of both. Pastoral peoples on the whole, however, show a striking similarity of

diet in different regions, and nearly always manage to balance their food supply either by trade or else by a little cultivation.

The herdsmen of the tropical African plateau, the *Matabele*, the *Zulus*, and the *Masai*, are great hunters and herders of cattle and sheep on the tropical grasslands. The *Bedouin* Arab herds camel and horse on the hot semi-deserts and oases of Arabia and the Sahara. The *Kazaks* keep the horse, sheep and two humped camel on the steppes of Central Asia. The *Lapps* are reindeer pastoralists of Northern Sweden, and have tribal relatives all along the Siberian plain. All these people live mainly on milk food. Most of them drink it sour for taste. The *Masai* mix both cow's and sheep's milk with blood taken from cows or sheeps. The *Kazak's* favourite drink is *kumiss*, made from fermented mare's milk, their staple food being either soured sheep's milk or mutton, but the camel's milk is also used. They make broth with mutton, millet and wheat, and milk which is a delicacy as cattle do not thrive in this region. The *Lapps* use reindeer milk, which is very sweet but contains little cream and does not make butter. Arabs largely from necessity, drink camel's milk. They keep powdered milk called *mereesy* which is used in lean times. Among herders there is no produce which is so widespread as the use of milk. Meat itself, is not as plentifully eaten among the herders as might be expected. The killing of a cow is an irrevocable loss of wealth. The *Masai* eat only sheep and gelding cattle, but never kill cows which are used as the beast of burden. The Arabs use very little meat, or the *Lapps* kill their reindeer only occasionally, or from dire necessity.

The importance of hunting among the herders depends upon the prevailing circumstances of the region and the prosperity of tribe. The *Kazaks*, for example, hunt only for as a pastime, but some *Bantu* peoples rely on the hunt to supplement their diet. Similarly the *Bantu* people also collect fruits from the wild plants that grow abundantly on the tropical grasslands. The *Lapps* also collect enough wild berries and roots to balance their semi-Eskimo diet. Among the *Kazak*, the poor families, who own no stock, generally resort to millet, wheat, or even rice cultivation in the oases, thus cereals and fruit are generally available by exchange to the herders, who, on the whole, live well. The Arabs, however, exist through the lean months on butter, milk, dates, and a handful of parched grain or flour a day. But the better off can obtain wheat, olives, lemons, coffee and Mediterranean fruits at the time of annual visit to the *Suk* (a kind of tent fair). The domestication of animals as a means of livelihood is a complex process and demands much of man. Nearly all herders treat their animals with consideration and even affection. The pastoralist has now ceased to rely upon nature for

his living and has achieved some measure of co-operation with his surroundings. The former has carried this advance much further.

Agriculture indeed makes available the whole range of local foods, and several others. By the use of implements, by the domestication of animals and by irrigation in dry places, plant breeds and grows in new climate. So then anything grown locally, is available for the diet of a true farming community. The Chinese use wheat and millet in the north, and rice in the south as their staple food. In addition the Chinese farmer breeds fish in ponds, but for lack of space domestic animals are few. Pigs and poultry eke out their diet, together with a variety of fruit and vegetables. Rice is the main crop of the Chinese farmer and he generally harvests two crops a year. Other than this are tea, ginseng and ginger, bamboo, mulberries and many kinds of fruits. Pigs and poultry are fed on scraps and the water buffalo is grazed between the mounds of the ancestral burying places attached to every village. For the poor Chinese a bowl of brown, unpolished rice boiled in water or broth spiced or flavoured, and a bowl of tea make the usual meal. Milk and sugar are never used. Soyabeans and many kinds of fresh vegetables and fruit make their staple diet. The richer farmers enjoy shell fish, minced perch, vegetable soup, fried rice and ginger, pickles and kidney bean and curd are fairly common, while the more prosperous take delicacies like shark's fins, bamboo shoots, crab, chicken, cabbage and ginseng. And for everyone there is always tea.

The peasants in the Eastern Europe are comparatively poor and rise towards the west. They depend largely on black bread (rye), beans and potatoes for their staple diet. But in Poland sugar beet, pigs, poultry and eggs are produced for export purposes. In Rumania the peasants' chief food is maize meal. They rarely eat meat, but have fowls and ducks, to take its place. Fruits of all kinds is grown in the Carpathian mountains. In the Mediterranean region people grow wheat, barley, vegetables, olives and fruits. They keep but few cattle, so the meat and dairy produce are scarce; goat's milk, olive oil and eggs take their place. The Greek and Italian peasants' diet is mainly sausage, bread, polenta and macaroni cooked in oil and flavoured with garlic or vegetables. Italian peasants often eat bark by necessity. This is the recurring tragedy of peasant folk.

In the Western Europe, U.S.A. and U.S.S.R., agriculture is no longer self-supporting. It has become part of the industrial pattern. This process has developed least in France, and most in Great Britain. In U.K., U.S.A., U.S.S.R. South Africa and Australia, agriculture is not husbandry, but carried on mainly for cheap cash crops. The people of these countries

live very well. In the Argentine and Uruguay the ranchers eat a lot of meat; beefsteak for breakfast is common. Rice and blackbeans is a favourite local food, but not a luxury for dish, in the towns. Among the white peoples, the Australians, South Africans and many Americans, have a higher standard of living.

It may thus be concluded that the world regions that are characterised by nomadic herding are mainly those that are dry, either actually or physiologically; Steppe lands, desert margins, and Tundra. The severally dry deserts of the old world produce little of forage and have few watering places. Hence, they are unable to support even sparse nomadic populations. The largest regions of nomadic herding are those of Central Asia and northern Africa.

2. FISHING

(Fishing is one of the four great primary industries of the world. Fish is the easiest available food whose supply is inexhaustible. It has been estimated that in the world as a whole fish form less than 3% of the animal food consumed by man, but in places such as Iceland, Newfoundland and parts of Norway and Japan they form a far higher percentage.) The proteins and fats in fish are easily digestible and compare favourably in nutritive value with beef. Fish fat and specially fish livers contain valuable vitamins which are essential in the prevention of rickets and other diseases. Fish can easily be caught because in raising the harvests of fish man has not to incur much expenditure. The breeding of fish does not tax in any way man's pocket or effort. The only cost incurred in obtaining fish is in catching it or in preserving it for future use at a distance from the place of production. In this respect it is the cheapest food-stuff. It supports a high population in those countries where land is not hospitable as in Norway or Japan.

Fishing is probably the most ancient of industries. Men were hunters long before they were farmers and fishing is one of the few forms of hunting that survives as a commercial industry. From time immemorial man has been a fisherman but his earlier ventures were confined to rivers lakes and coastal waters for his boats were too frail to allow him to venture far from land. Still there are strange methods in use in some lands. The natives of northern Queensland use a long pronged spear for killing fish and rarely miss their quarry and those of British Guiana shoot them with arrows. Traps at all shapes and sizes are common in many lands while in some rivers in North America salmon is caught by means of water wheels, Chinese have trained cormorants to dive and bring fish to their owners. But in more modern times

1 E. Huntington, *Principles of Economic Geography*, p. 312.

the use of steamers, travellers and other mechanical devices have entirely changed the fishing methods.

The term fishery is usually applied to the taking of all forms of life from rivers or seas. It thus includes the catching of lobsters and crabs, the collecting of oysters, the hunting of whales and seals, gathering sponges and corals as well as the capturing of true fish.

Of the latter those like haddock, sole, plaice, cod, turbot and halibut living on or in bottom of the sea are known as "demersal" or deep sea fish. Others such as herrings mackerel and pilchards that swim near the surface swimming fish. Sea fisheries are generally considered to be the cause the led people of maritime continents and countries to sail the open seas. The sea-farming habits of the maritime nations are generally contributory to the development of the fishing fleets that serve as the training grounds for sailors and navigators. "Fisheries are thus the schools of seamanship for those who live on the water learn to read the clouds and find their way over horizonless seas."

Conditions of Growth. The fish as well as all marine life depends on the plant life and tiny insects of the sea. The plant life in the seas is largely confined to the shallow coastal water, and the surface waters. Rooted plants are entirely restricted to shallow waters close to land. Microscopic plant life makes up a considerable part of the mass of floating organic substance called *plankton*. These plants have the power to transform the salt of the sea and the air into organic substances by the help of sunlight. These planktons at the surface of the ocean are the principal basis of the seafife for upon them myriads of small, sea animals feed and they in turn are the most important sources of food for fish. Thus the plankton mass, composed of tiny plant and animal forms, is the chief reservoir of fish food. It is most abundant in coastal waters. Besides the salt is also carried by river debris and is spread over the ocean floor. It is more abundant near the mouth of rivers and sea-shores. Moreover, the cool temperatures and the accessibility of sunlight are the necessary conditions for the growth of the plankton. The penetration of the sunlight requires shallow water. Hence the most profitable commercial fisheries are found in waters less than 100 fathoms deep. Most of the world's fishing is done along the margins of continents in waters whose depths are less than 200 fathoms.

Most of the fishing industry depends on the two habits of the fish. First is the spawning habit of many species which lay their eggs only in the rivers or in the shallow waters near the shore. The second is the congregation of the fish to feed upon the bottoms, in shallow waters, commonly known as "banks",.

The occurrence of such banks near the shore of north-eastern Asia, north-eastern North America and north-western Europe is responsible for three great fishing regions.²

Geographical Distribution of Fisheries. The following table shows the areas where the approximate catch of sea fish per year is given in millions of pounds as well as the approximate catch per capita.³

Total annual catch of sea fish in millions of pounds

Japan	7,750
Chosen	3,350
U.S.S.R.	2,900
Norway	2,400
U.S.A.	2,300
Great Britain	2,200
Germany	1,300
Canada	920
Alaska	770
Spain	750
France	690
Iceland	500
Netherlands	500
Portugal	475
Sweden	235
Denmark	190
Formosa	160
Newfoundland	118

Annual catch of fish per capita in pounds

Alaska	12,300
Iceland	4,200
Faroe Islands	1,600
Norway	830
Nowfoundland	410
Chosen	145

² Russel Smith, *Ibid.*, p. 324.

³ E. Huntington, *Principles of Economic Geography*, p. 319.

Japan	112
Canada	93
Portugal	84
Netherlands	57
Denmark	51
Sakhalin	51
Great Britain	51
Sweden	37
Formosa	34
Kwantung	34
Estonia	34
Spain	32

Two things will be clear from the above tables that firstly the fish are the products of cool regions and secondly that Japan and its dependency Chosen catch as much fish as Russia, Norway, the U.S.A., Alaska, Great Britain and Germany while Norway catches more than U.S.A., Alaska and the islands of Iceland and Newfoundland catch more fish than such huge countries as India and China.

Importance of Fisheries. Although fishing is an important industry in localities such as Norway, Newfoundland, Alaska and Japan, the total value of its products does not give it high rank among the main branches of modern production. The total value of world's fish products has been estimated to be less than a billion dollars. Nevertheless, fish are worth twice as much as the world's rubber, and almost as much as either the wine, the tobacco, or the tea, coffee and cocoa combined.⁴

The fishing industry has had great importance in the rise of maritime nations so much so that the merchant marine of many countries like Britain and Norway has depended on fishing grounds as a training school for seamen.

Sources of Supply. The important fishing areas in general lie partly in the littoral, or shore-belt of shallow water which covers the continental shelf, or submerged platform surrounding the continents. Others are locked in the shallow water overlying banks, which are elevated parts of the sea floor some distance from the shore. The commercial fishing grounds of the world are outside the tropics and in the Northern Hemisphere in the North Atlantic and North Pacific waters, the tropical waters are by no means devoid of fish, they are noted for their variety and beauty, but they contain fewer edible fish. In the low latitude

⁴ R. Smith, *Ibid.*, p. 328.

the number of fish species is greater than it is in the middle and high latitudes. It is true that there are no such regional concentrations of a few valuable and better known species as there are farther north⁵, which have the habit of spawning in large "shoals" in certain seasons (2) Further, the lower temperature in the temperate regions is also helpful in keeping the fish for some time in good state. (3) Owing to the unfavourable topography of land and infertility of the soils resulting in little development of agriculture the large majority of people have been driven to the sea for their food supply. (4) The major portion of the coastline has a number of protected harbours. (5) The neighbouring forests provide raw material for fishing boats. (6) The cool waters have a number of edible fish and the quantity of dangerous or poisonous fish is very small. (7) But the outstanding significance of Northern Hemisphere fisheries is associated with the presence there of large areas of shallow water along the margins of the continents.

Fish also multiples rapidly in the equatorial region but there are many hindrances in the successful development of the tropical fisheries on a commercial scale. (1) There is a smaller concentration of plankton in the tropical seas. (2) There are more species of fish in the tropical waters but fewer individuals of many kinds. They are of different colours and form and are unsuitable for human food. (3) They suffer the further handicap of being softer and inclined to spoil more readily so that they are commercially less valuable, though they may be of some importance locally to the native inhabitants. (4) The area of the continental shelves is very small in tropical seas than in the North Temperate region.

Three Kinds of Fisheries. World fisheries may be divided into three main classes, viz., the fresh water; the shore water and the deep sea fisheries. Fresh water fish is found in rivers, lakes and artificial bodies like ponds. They are important only for local consumption and inland trade over comparatively small distances.

The shore-fisheries are found all along the coasts. They are generally caught in the coastal waters of Japan, Sakhalin, and eastern Siberia, the Pacific coasts of north-western U.S.A. Canada and Alaska. (3) the coasts of north-western Europe and (4) The coasts of New England, maritime Canada and Newfoundland. These all areas are the bases for the fishing fleets of many nations which bring in annually several hundred million dollars' worth of cod, haddock, halibut, herring, mackeral, and other fish.

⁵ Finch and Trewartha, p. 518.

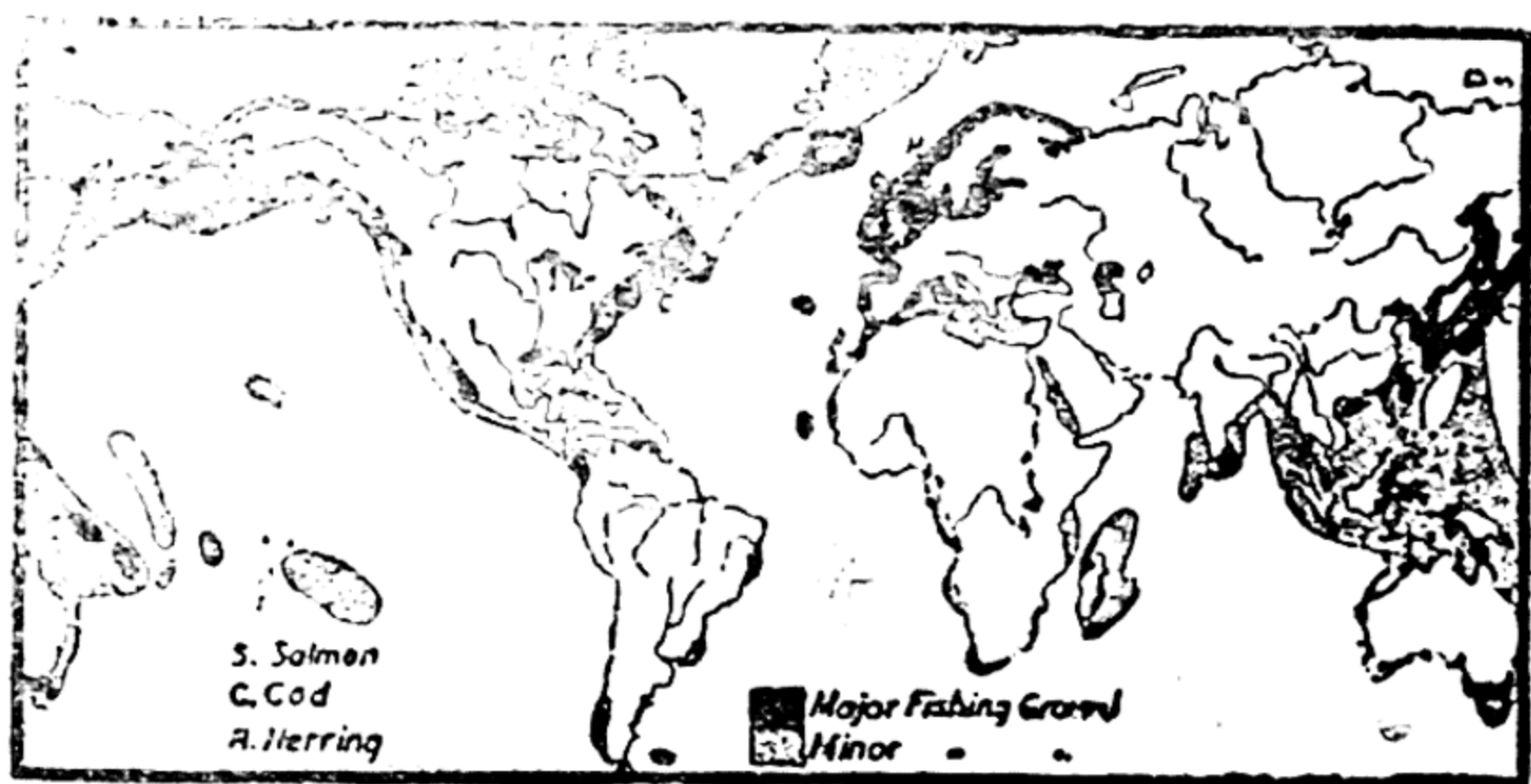


Fig. 20—Fishing Grounds of the World

The North Pacific Coast Fisheries. The Pacific coast fisheries of North America are particularly important for salmon and trout. This fishery is important on the coasts of Alaska, British Columbia and the western United States. From these regions come practically all the world canned salmon. The habits of this fish make it practically easy to catch. The salmon are born in fresh water but spend their mature life in the sea. Each spring and summer millions of salmon, driven by the urge to spawn, leave the ocean and ascend the stream emptying into the Pacific from the northern California to the Bering Sea. They start on their final journey in prime condition and then do without food, their stored up body fat being sufficient for their needs. Many are caught on their way up streams but those that evade net or swim against the current, surrounding waterfalls, leaping obstacles and fighting speedily onward and upward to their spawning grounds. Before winter sets in each salmon reaches the river or lake of its birth and there in the sand or gravel deposits its eggs. The fact that the salmon returns to the spot of its birth makes it particularly easy to catch these fish in nets as they descend the coastal rivers. The Pacific salmon spawns but once and death follows spawning one generation dead before next arrives. They go in salt water when only 6 months old, others wait until their second year, when they may be 6 inches or more in size. In ocean they disappear until they become mature when they follow the path of their ancestors. It is during their homeward migrations that salmons are caught in the estuary creeks. Despite the enormous number of fish in the sea, long continued and destructive methods of fishing have considerably reduced the numbers. But now as a result of conservation measures adopted since 1920, salmon runs have increased in some of the streams.

The salmon fisheries of the British Columbia together with those of Alaska and north-west of U.S.A., are the most valuable in the world. Japanese and British salmon fisheries are next in importance.

The incoming salmons are caught by a kind of wheel, which has wire buckets attached to it. As the wheel revolves in the current the fish are caught by the baskets and are thrown into a boat below. They are then taken to canaries and fed into machines which grip each salmon, cut off its head, tails and fins, split the body, and clean it, completing the job of one fish per second. They are then forced under revolving knives that cut them into suitable pieces ready for the cans. From the time it enters the canary until it appears on the table for use the salmon is untouchable by hand. The tinned salmons are exported abroad. More than a billion pounds of salmon may be caught on the Pacific coasts of North America. In a bad year the figures may sink to far lower levels.⁶

The North Atlantic Coast Fisheries. The North Atlantic Coast fisheries include the coast fisheries of New England, Newfoundland, and maritime Canada. Fishing here is carried on both in the shallow in shore coastal waters and in the region of the banks. The fishermen carry away more than a billion pounds per year⁷. The North Atlantic Banks, extending as broad submarine elevations to the eastern coast of Newfoundland from western end of Nova Scotia to south of Newfoundland are the world's greatest cod fisheries. This region lies from 50 to 150 miles off the shore and varies in depth from 10 to 150 fathoms. The cold Labrador Current makes the water cold and fishing here is carried on under difficulties of fogs, rain, snow and low temperatures and blizzards, while icebergs may crush the little vessels in thick fogs on account of darkness. Thus fishing on the Grand Banks is an exceedingly dangerous calling.

The fisheries of north-eastern North America are based on a rich combination of rivers, bays and shallow off-shore banks.⁸ The fish gather about these banks to feed on the vast amount of planktons, which are brought down by the Arctic current. These tiny fish are fed by herring and the herring and smaller fish are eaten by cod. The cod is the chief catch and great loads of cod are landed on the quays of St. John.

On the banks steam-trawling has not developed to any extent, partly because the nature of the bottom is imperfectly known. The vessels mainly used are sailing craft of from 60 to

⁶ E. Huntington, *Principles of Economy Geography*, p. 314.

⁷ E. Huntington, *Ibid.*, p. 316.

⁸ R. Smith, *Ibid.*, p. 324.

100 tons each carrying a crew from 12 to 20 men who do the actual fishing from small flat bottomed boats called "dorries". Both trawl and hand lines are carried. As soon as the trawl lines are baited they are thrown overboard; the end of the line is carried to the bottom by anchor, the top is connected to the bony.

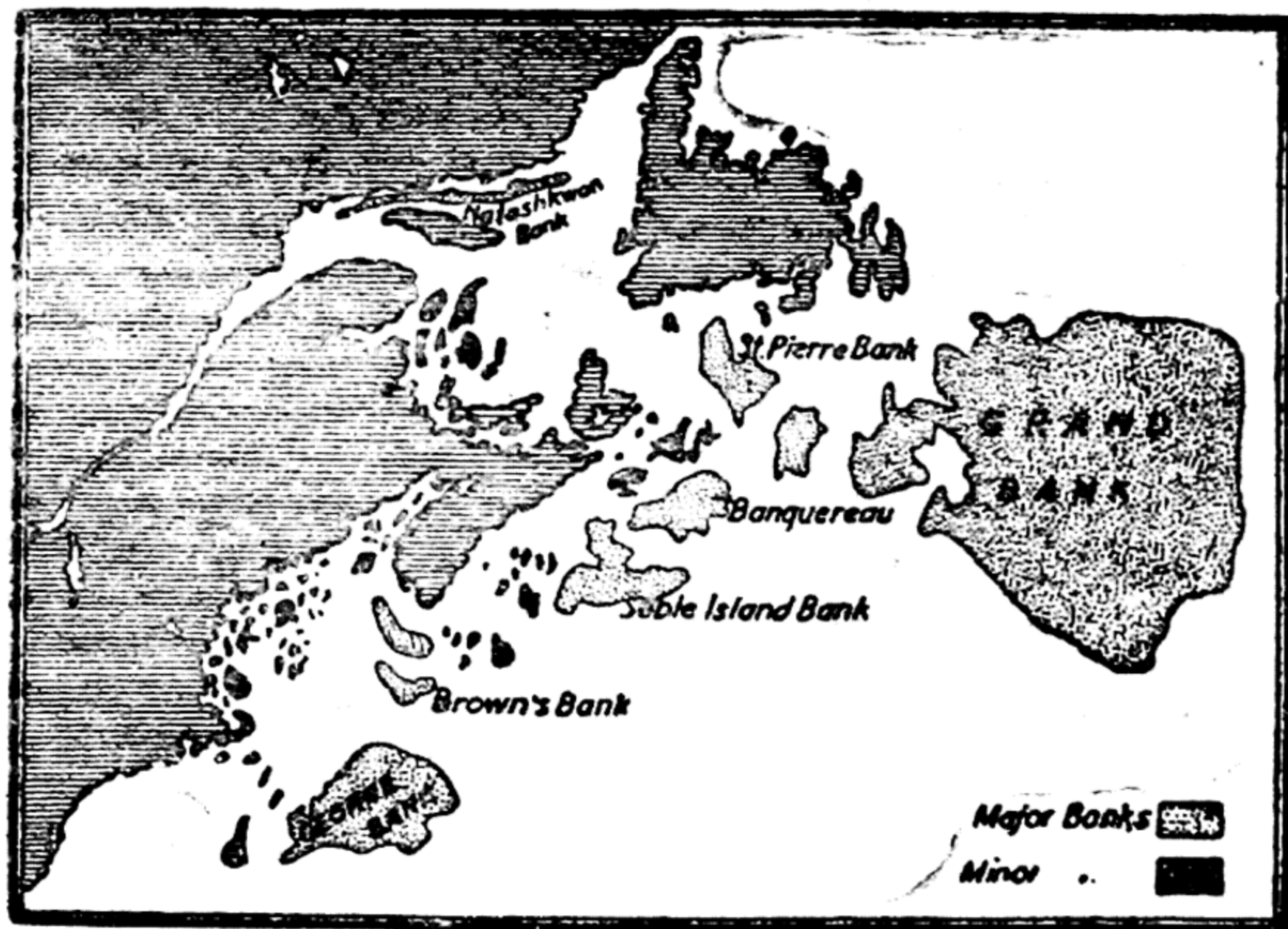


Fig. 21—Fishing Banks in the North Atlantic

A number of trawls are laid and pulled up at intervals to collect the fish. Two to three hundred are often caught on one trawl line. They are then, splitted, cleaned and salted, and are hung on the poles to dry before marketing them.

The Newfoundland cod, in the form of 'stock-fish' are a common feed of the Negroes in Jamaica and West Indies. They are also eaten in large quantities in South America. Much of the fish is sent to Brazil, and some is exported to Portugal, Spain, and other Mediterranean countries, where meatless days are prescribed. The exports are from Newfoundland, Canada and U.S.A.

The fishing within a limit of three miles off the shore is territorial and limited to the people of the country owning the coast. While fishing outside 3 miles limit is free to all. The Grand Banks are, thus, free to all. Numerous fleets from Britany and the west of the England go in the fishing season on the Grand Banks, and these Banks are populated with hardy fishers for a few months each year.

North European Fisheries. (1) The North Sea is the greatest fishing ground in the world, where fishing is carried on all along the coastline of Great Britain. But the most important centre is the Dogger Banks which is only 6 to 20 fathoms deep although there are many Banks where fishing is carried on in good quantities. In Dogger Banks the large trawling is possible. Moreover, the warm waters of the Gulf Drift is an important factor in fishing round this coast. The Dogger Banks extends about 200 miles and the depth of the water varies from 65 to 80 feet. The North Sea is surrounded by populous lands, being within easy reach of the British, French, Belgian, Dutch, German, Danish, Swedish and Norwegian fishermen, large quantities of fish are here caught. The fact that it is so easily accessible to England, Germany, France and other progressive countries makes this an even greater asset than the Newfoundland banks.⁹

Besides the Dogger Banks, several other banks are engaged in fishing, viz., (1) the Goodwin Banks near the coast of Kent. (2) The Yarmouth sand banks near the coast of Norfolk, (3) Silver pits and Well Bank near the Dogger Bank, (4) Berwick and Mar Banks near Berwick, (5) Long Forties and (6) Horn Reef, which extends upto Jutland. The fisheries of the U. K. are said to employ above 80,000 men and it has been estimated that the whole fishing industry gives actual employment to above double the number told.¹⁰

Large amount of herrings are caught in North Sea. Drifters do not go so far afield as the trawlers for the seas round the British Isles abound in surface fish. Drift nets hang upright in the water. They float just beneath the surface, are supported by large corks whose position is marked by bouys and are weighted down to keep them vertical. The fish swim into the meshes of net and are caught. Herring shoals suddenly appear in one quarter and disappear just as quick by a couple of mouths or so after. Herring fishing begins off the west coast of Scotland in May. From the beginning of June to middle of July the Shetlands are a scene of great activity. Each morning large catches are landed at Balta sound where several thousand folk are kept busy in cleaning and salting herrings and packing them into barrels for export. Towards the middle of July the fishing season ends. The drifters now move southwards and from the middle of July until the beginning of September fish are caught in succession off Berwick, Fraserburg and Aberdeen. In September the fish appear off the Yorkshire coast, then from October to December on the Yorkmouth. The season finishes

9 E. Huntington, *Principles of Economic Geography*, p. 316.

10 R. Smith, *Ibid.*, p. 328.

towards the end of December. More than 80% of the British herring is exported. Barrels of salted herrings are sent chiefly to Germany, Poland, Prussia, and smaller Baltic states and smoked herrings are despatched to the Mediterranean countries.

(2) The fishery off the Iceland coast is carried on by a few Danish, Norwegian and British crews, but specially by the French, on the seas lasting all the year round. Each of the European nations engaged in fishing in its waters has a gunboat stationed here to see that the rules regulating the industry are kept. The fishermen carefully pack and store the fish in the hold of the fish until their return home. Cod fish are found near Great Fisher Banks, where plaics, soles and haddocks are also found..

(3) Norway is of all the European nations the most dependent on fish. With its cool climate, its mountainous rock land, and its coast full of bays, it duplicates in many respects Nova Scotia, Newfoundland, etc.¹¹ The Cod are caught here near the Lofoten Islands and the herring in the bays about Bergen in southern Norway. Norway fishing employs about a hundred thousand men for at least a part of each year. The catch of fish is about five times as great per capita as in Great Britain.¹² Norway exports $\frac{2}{3}$ of her Cod fish, either salted or dried or as Cod liver oil, which is used for medicinal purposes as lubricant, and for dressing Chamois and other leather as well as for feeding cattle.

Japanese Fisheries. Japan is one of the most important fishing nations of the world. If the catch in Korea and Formosa be included Japan easily comes in the list accounting for a little more than $\frac{1}{3}$ of the world's supply. Over a million and a half people are engaged in fishing nearly half of whom are seasonal fishermen. The total catch credited to those living in Japan proper was valued at 358,000,000 yen in 1938. An additional 122,000,000 yen in Korea, Formosa, Karaputo and South Seas raises the Empire total to 480,000,000 yen.

The continental shelf around Japan comprises the greatest fishing grounds of the world. Both in tonnage and value, the catch exceeds that of any other country. This catch is about four times that of Great Britain. Japan is responsible for half the world's catch and fish are the seventh most important basic export from Japan. These pastures of the sea furnish a considerable part of the Japanese diet for fish is an integral part of every meal. The Buddhist aversion to a meat diet has tended to confirm the importance of the fisheries.

11 Casey and Bergmark, *College Geography*, p. 533.

12 R. Smith, *Ibid*, p. 328.

Fishing interests characterise all shores of Japan. The calm inland sea, the stormy Shishima Islands and the coast of Honshu each has its fishing villages. The beach is strewn with boats nets and drying fish. The more important fishing activities are in the hands of large corporations and the operatives are the hired hand.

Off the east coast flows the warm Kurosivo or Japan current with a branch that enters the Japanese sea, while cold currents circulate in both the sea of Okhotsk and Japan Sea. Thus varied environments offer a habitat for many kinds of aquatic life. The limited supplies of food on the land, the coastal character of the population and highly indented shoreline all tend to push people to the sea so that slightly over 10% of the population of Japan is directly engaged in fisheries.¹³ Within the present century, fishing has expanded from a littoral and small boat industry to one that ranges from Sub-Arctic to Antarctic.

Coastwise and near shore fishing account for 60% with leading items of catch in order as sardines; seaweeds (for food, fertilisers fodder or iodine); salmon, cuttle fish; yellow tail and shell-fish. Out of the total of 364,000 boats only one-fifth have engines so that most of the near shore catch is obtained in picturesque sail or row boats which return home each night.

Deep sea-fishing represents 28% of the total industry, with the balance covered by whaling, coral and pearl collection, and agriculture on land, sardine, cod, bonito, shark, tuna and mackerel are the leading fish. Modern refrigeration has made it possible for Japanese vessels to operate in the far north, even along the coasts of Alaska.

Under the treaty of Portsmouth (1905) which closed the Russo-Japanese War, Japanese fishermen were given certain rights along the coasts of the Soviet marine provinces, Kamchaktka and Sakhalin. Specified fishing 'lots' are provided on leases and arrangements concerning the renewal of leases for these concessions have been a recurrent source of international friction.

In addition to the food fish, secondary products are worth between 150 to 200 million yen annually; fish guano, dried bonito, dried cuttle fish and squid being some of the chief items. The cattle fish, squid and octopus are increasingly, consumed at home and in China; sea-cucumber is found round the coasts of Honshu and in Hokkaido and is largely exported to China, toge-

¹³ Nicholson, *Note on Fisheries in Japan*.

ther with shark's teeth. Sea-weeds are collected and dried and sold as relish for soap, fish or rice; sea weed is also turned into a kind of jelly as well as being used in the manufacture of isinglass.

Japan has a unique industry in the breeding of pearl oysters and of 'culture pearls'. Grains of mother of pearl are introduced between the shells of three-year-old oysters, causing the oyster to secrete a pearl round the irritating body. In four years a pearl of considerable size is formed. The 'culture pearls' are from Toba in the Bay of Ago.

Only a small part of fish are exported to foreign markets notably China because of her extensive home consumption.

Trade in Fish. International trade in fish is not important in the countries having the greatest industry. By far the greatest fish exporting country in the world is the North Western Europe, and the greatest importer is southern Europe, especially of the dried fish. In exchange for fish from North Western Europe, wines, citrus fruits and olive oil are supplied by the southern Mediterranean countries. U.S.A. with Alaska and Canada with Newfoundland are also great exporters of canned-fish. Canned salmon is said to represent more than half the value of the total output of canned-fish.¹⁴ Norway exports large quantities of canned and salted cod fish.

Uses. Apart from food several uses of fish have been found out and many new industries have been started. Fish meal is a valuable manure besides being used as a feeding stuff to stocks of all kinds, for milking cows and for eggs laying poultry. The fish oil is another important product which is used for medicine lubricating, tanning, soap making, tempering steel. Gelatine and isinglass and ivory are other products. Fish skins are sometimes used as leather.

Whaling. Whaling is an important branch of fishing industry which differs considerably in technique from the ordinary sea fisheries. The chief commercial value of both whales and seals lies in the oil obtained from their blubber (i.e., the coating of fat beneath their skins). There are various kinds of whales. Some such as the true or Greenland whale—range through the Arctic waters and others—such as the rorquae whale—are in the Atlantic between Norway and Newfoundland. While spern whale live in somewhat warmer waters. These fish yield the spern oil (which is found in huge cavity inside their heads) spern oil is used with bees-wax in making 'Spermacetic' (a component of candles) and many kinds of cold creams and face

M. N. Basi, *Ibid*, p. 124.

salves 'Ambergis' (a substance used in making some kinds of perfumery) is got from some spern whales.



Fig. 22—Showing Whaling Stations

True and rorquae whales yield whalebone as well as oil, which is valuable lubricant. The improved devices for catching whales—the new type of harpoon and air pump whereby the dead body of the whale could be made to float on water—have had the effect of seriously reducing their number, and at the beginning of present century it seemed as if the whole business was doomed to early extinction. The hunting has now been regulated, a licence is required and the number of whales that may be killed is limited.

Wooden vessels are still used more especially in ice-bound seas, but many of them have been replaced by modern steel ships. The latter are veritable floating factories for they are equipped with apparatus for flensing the animals and extracting oil, fertilisers and whalebones from caracases. The harpooning is carried out by small ships called "catchers". The "catcher" is swiftly swung into position, and the harpoon, with its charge of powder, is fired from the powerful gun in the bow. The great dart, with cable attached enters the monster and death follows soon. Now the carcass is inflated and towed to the factory ship, where it is hauled on the floating platform alongside the vessel where the cleaning and cutting is done and the blubber is fed into huge boats whence it emerges as whale oil, which is used in the manufacture of soap, dressing the leather and preparation of flax and jute and also for lubricating machinery. On a few of the newer vessels the whale is drawn tail foremost,

through a forward hatch, worked by an electric windless which carries it direct to the flensing floor on board the ship itself.

Norway is the leading country engaged in the whaling industry. Her ships hunt whales round Iceland and other waters of the North Atlantic. Her vessels also travel to the Ross Sea, an area under the administration of the New Zealand. The other important whaling areas stretch from Palagoria and the Islands on the west side of Greenland eastward along the border of the track ice to Cape Town, and around south Georgia, the South Shetlands, South Orkneys and the South Sandwich Islands. The hunting season at the south Georgia lasts from the end of September till the middle of May, at the south Shetlands from the latter part of November to the end of April.

3. LUMBERING

The basic needs of a man are for food, for clothing and for shelter. And as soon as these fundamental needs are satisfied, he plunges headlong into all sorts of activity—fair, foul and indifferent. But he cannot work in a vacuum. He must be doing something at all hours; so raw materials are again essential. Moreover, most of his activities are guided by these three primary needs, and though one of these may be assigned a logical priority over another, actually all of these needs run parallel courses.

Almost one-fourth of the land surface is covered with forests. Timber found on this forest covered area may be classified into three main classes: (i) Coniferous softwoods, (ii) temperate hardwood or deciduous and (iii) tropical hardwood or evergreen.

The principal varieties or species of coniferous softwoods are pine, firs, spruces, larches, cypresses and junipers. Of the total output nearly 50% wood is today cut from the coniferous forests which are mostly found in the snowy regions like Siberia and Canada. Apart from these the coniferous trees are found on the slopes of the Himalayas at an altitude of 5000 to 7000 ft. around Kashmir, certain remote mountains in western China, the Andean slopes of southern hill and New Zealand. (The pine is the chief timber among conifer variety for commercial purposes. It is conveniently used for the manufacture of furniture, for the making of packing cases and boxes, for mats and decks of ships and as the raw material for matches.)

(The temperate hardwood or deciduous varieties are represented by oak, birch, beech, maple, ash, walnut and elm. It is mostly used in the manufacture of furniture.) Of the world's total cut 40% is shared by the temperate hardwood. Important regions of the hardwood timber are the Alps, the Pyrenees,

Central Russia and Siberia, Japan, Appalachian region of U.S.A. Patagonia and southern Chile.

(Tropical hardwoods are teak, mahogany, ebony, rosewood and dyewood, etc.) The chief regions are the Amazon forests in South America fairly known as Selvas, the Congo basin forests and the upper Guinea coast-lands of Africa and the forest of East Indies. Tropical woods are used mostly for furniture making and cabinet work and the chief varieties are mahogany, ebony and rosewood.)

Continental Distribution of Forest Areas of the World¹⁵

Continents	Of acres in millions	Percentage of world forest area	Relation of forests to total land area
Asia	2096	28	22
South America	2093	28	22
North America	1444	19	27
Africa	797	11	11
Europe	774	10	31
Australia	283	4	15

North America. Nearly 20% of the world's forest areas are confined to North America. (Canada is most important in timber resources and is known as "the Empire's storehouse of softwood supplies.") Consequently lumber industry was enormously developed in the regions of British Columbia, Ontario, Quebec, Northern Prairie provinces and New Brunswick. The Canadian forest industries have adopted modern planning methods and have undertaken reforestation schemes. There are two important belts of soft wood in the U.S.A.; one in the east including New England, the Appalachian highlands and the Atlantic coastal plain, the other in the west located in the rocky mountains and Pacific slopes. The forests of U.S.A. cover nearly 30% of the total area.

Europe. Nearly one-third of Europe is forest covered. The whole continent produces about 10% of the world's total output. The best conifer trees are found in Scandinavia, Finland, the Baltic States and Northern Russia. The lumbering industry, therefore, has developed in those countries to a great extent. Cheap and easy transportation by rivers and availability of mechanical power are the other factors which give impetus to the industry.

(Scandinavian countries are the most important timber

¹⁵ Zen & Sparhawk, *Forest Resources of the World*.

producing regions in Europe. These alarming prospects have led the Scandinavian countries to guard this important source of national wealth quite zealously. Window frames, paper, matches, wood pulp and ply wood form nearly 40% of Swedish exports. Norway exports constitute nearly one-third forest products. In Norway wood is the basis of manufacturing industries such as the manufacture of pulp, newsprint, cellulose, cardboard, matches and paper.

Russia contains vast resources of pine, fir, larch and spruce, which are used for timber, paper making, and the manufacture of cellulose.) Other than these, France, Germany and Central European countries are now carrying on scientific forestry in order to ensure a steady supply and recently Great Britain has also come into line.

Asia. Asia contains 28.% of the world's forest. Siberia is the store-house of forest resources and mainly consists of conifers. But the difficulties of working them as a result of climate, inadequate means of communication, lack of finance are responsible for the slow development of lumbering industry there. Japan, China and India are also liberally gifted with forests.

Of the total timber used by man nearly 80% is soft wood from the great coniferous forests, while the remaining 20% of hardwood about 18% is obtained from the Temperate Forests and only 2% from the Tropics including the enormous Equatorial Rain Forests. This disproportionate use, dictated, no doubt, by the primary needs and conveniences of mankind, has, however, led to serious complications; it has resulted in a rapid depletion of the coniferous forests of several regions and in attendant shortage of softwood in many countries.

Another alarming feature of the lumbering industry of the world is that the consumption is greater than the growth in every country. At present the amount of timber cut annually in the world is on an average 30% greater than the growth of young trees. Now to escape this unhealthy condition, many countries especially European and American countries have adopted the policy relating to the conservation of forests.

Though the consumption exceeds the growth, but it is very surprising to note that in South America, Africa, South-eastern Asia and East Indies forest growth is rapid due to favourable climate and therefore, have great forest reserves. But certain drawbacks such as poor transport facilities have made the progress halting. The world production of wood has been definitely on the increase since the end of World War II.

(The importance of wood to man is immense. As the aggregate value of world annual output of wood is more than three

times the value of the annual output of coal, therefore, the importance of wood in world economy can hardly be exaggerated.

Forests have direct and indirect utilities. The direct utilities conferred by the forests are—(i) forests render the climate more equable and contribute to increased rainfall, (ii) They increase the fertility of the soil, (iii) They decrease the velocity of air current. The direct utilities relate chiefly to their produce, such as timber and firewood, raw materials which they afford for various industries. Timber is used for making boxes, house building materials, furniture, masts and decks of ships, railway carriages and also for distillation, dye-stuffs, fence posts, etc. Pulp is important raw material for the manufacture of paper. Other products are rubber, gutta-percha, quinine, tar, turpentine, resin, lac and cork, etc. Again forests are good grazing lands. Forests are undoubtedly a great source of revenue to the State.

4. LIVESTOCK RANCHING

The steppe lands and desert margins of the Americas and Australia are regions of livestock grazing also, but the economic nature of the industry there is different from nomadic herding. In the United States it is called livestock ranching, and that name may be applied to it generally. It is, from one view point, a retrograde form of settled agriculture. Farmers of European origin, accustomed to tilling the soil, occupied dry lands in the new continents and took up livestock grazing because aridity did not permit of satisfactory tillage. Although they adopted the means of existence of the pastoralist they did not adopt the nomad's manner of life. Instead they retained the tradition of settled habitation, the ranch house, and the idea of private ownership of the grazing lands, which were protected by patrol of their borders and by the ultimate building of fences to separate properties or even to divide individual holdings into great pasture fields.

Livestock ranching, unlike pastoral nomadism, is a commercial form of land use. The livestock products are used by the ranchman to a limited extent only. They generally sell them for a cash return, with which the ranchman buys his requirements. It is also a more intensive form of agriculture than pastoral nomadism. They give attention to the selection and breeding of stocks, the artificial provision of water through wells, and even some tillage of the soil where a supply of irrigation water permits. Thus supplementary feed crops may be grown and some food for the ranch family. Though ordinarily ranch animals are confined within the ranch limits, but this is not always the case. In North American Cordilleran region, for example, cattle and sheep are driven from winter pastures on

the low land ranches to summer grazing on mountain pastures that are not a part of the ranch but are hired from governmental or other owners. This kind of seasonal migration of livestock is very ancient and belongs also to pastoral nomadism in the old world and to other types of livestock management as well. It is called '*transhumance*.'

The ranching areas are generally found on the humid borders of the North American high plains, where good railway transportation permits ready access to a large market. The ranches are smaller and the livestock industry more closely associated with crop tillage than in the distant northern Australia. In the latter region there are in fact some of the largest ranches, or "Cattle Stations" in the world, several of which reach an area of 5,000 sq. miles each. On the desert margins everywhere the capacity of the land to support livestock is limited by the sparsity of the forage, and the number of livestock units per sq. mile is small. In the good grasslands of western Nebraska, for example, 10 acres may be sufficient to support one animal unit, but in the drier lands of central Wyoming it may require 25 to 50 acres, and in the desert lands of Arizona and Nevada more than 5 acres. Beyond a variable aridity limit, the area, required to support livestock sufficient to maintain a commercial ranch unit becomes so great that it is no longer profitable to utilize it for ranching.

Dairy Farming. Dairy farming is an important industry in all lands with good pasturages. Dairying is an intensive phase of commercial crop and livestock farming in which crops are raised to feed dairy cattle and in which milk and its products furnish the principal source of cash income. Dairying is more intensive use of the land than beef production because a given quantity of feed will produce, through the medium of cows, at least two or three times as much as human food in the form of milk as it will in the form of beef. However, it requires more of the farmer's time and labour to produce it.

Conditions of Growth. One writer has described the typical dairy region as follows:—

"The characteristics of a naturally good dairy region will generally be found to be rolling, undulating, somewhat hilly surface, a soil not too heavy and damp, but deep, loamy, and retentive of moisture; sweet and nutritious herbage of natural grasses that spring up early and tend to grow vigorously late in the season, a somewhat low average temperature with frequent showers in the summer and never failing supply of good springs."¹⁶

Modern inventions have done a great deal to develop the dairying by devising substitutes for various of these geographical aspects of the ideal dairy region. Thus, the silo and soiling crops are used to provide succulent feed for the cows during the summer drought and to extend the use of such feed throughout the year. Refrigeration is used to project the dairy produce from the effects of high temperature, deep wells and mechanical pumps make a supply of spring water unnecessary. It is to be noted, therefore, that many important dairy regions of the present have none of these ideal characteristics and that very few regions are ideal in all respects.

Commercial dairying prospers under varied climatic conditions. But the best climate is one with a winter averaging not lower than freezing and a summer which rarely has temperatures above 80° and has an average of perhaps 65°. ¹⁷ Pasture hay, silage crops, and grain concentrates are required. This means that the grass or other feeding stuff must be produced in large quantities.

There are extensive savannas in the equatorial belt while rainfall is insufficient for tree growth or characteristic vegetation. The steppes as well as the summer pastures on the mountain slopes provide sources of food for cattle in summer in Asia and Europe, while big ranches have developed in the American prairies. But the mountain pastures are generally poor. The Pampas of Argentina, the Velds of South Africa and the Downs of Australia—all account for the enormous exports of the dairy produce.

Thus it will be clear that dairy farming is an important vocation in the cool temperate lands, where the dairy cattle thrives well, where there is abundant growth of grass owing to the favourable climatic factors—where summers are comparatively cool and winters mild and a moderate amount of rainfall falling throughout the year keeps the pastures fresh and green. Such climate conditions are to be found in the western European dairy belt. The dairy produce, are by their nature, so perishable that they must be marketed within a few hours of their production and this requires that large urban markets must be easily accessible. This fact is exemplified by the examples of the dairy regions which are all near the great industrial cities of the North Western Europe, North Eastern U.S.A., and adjacent Canada.

Besides this, the low temperatures of these dairy regions help in the preservation of milk and other dairy produce. This brings us to the fact that dairy industry flourishes best in marine

17 E. Huntington, *Principles of Economic Geography*, p. 281.

climates where there are not too cold winters causing expensive protection of the dairy cattle but the cattle are kept and fed in open sheds throughout the year.

Dairying as an industry requires a large supply of labour for a constant attention of the cattle and specialised knowledge for the making of dairy products. It is, therefore, an industry of the densely populated areas.

Places of Production. The North Western Margin of Europe including the plains of Ireland, England, Northern France, Belgium, Holland, Denmark and Germany; north-eastern Coast of North America; South Eastern Australia and New Zealand are then the chief dairy belts of the world. In certain mountainous countries like that of Switzerland and North Italy dairy cattle are also reared. The milk cattle and hence the art of dairy farming has a very insignificant place in the Oriental and Mediterranean agriculture. In Oriental countries, the change from an extensive type of agriculture to intensive type of Far Eastern agriculture came before scientific breeding and selection development cows giving high annual yields of milk. Another reason for it is that the keeping of milk and milk products without ice, artificial refrigeration or cool spring water is so difficult that people in hot climates were virtually unable to make good butter or cheese before the recent development of artificial cooling. Moreover, there are no poor summer pastures in these densely peopled subsistence farming regions. Neither have the inhabitants of these regions the cash incomes that would enable them to support dairying on a large scale. The dairy regions of Australia and New Zealand are of recent origin and hence had the benefit of cheap land, efficient transportation, and protected access to the large British market.

The available statistics indicate that there are about 650 million cattle of all kinds in the world. Rough estimates show that of this total less than one-third are dairy cattle. Europe (including Great Britain and Ireland) and the U.S.A. are estimated to have considerably more than half of all the dairy cattle in the world. Europe having more than twice as many as U.S.A. produces an even larger part of all dairy products than numbers of cow suggest because production per cow is relatively high in these regions.

Western European Region. The most important dairy region is the North Western Europe belt which stretches along the northern plain of Europe from Western France to Denmark, Sweden and Russia. Throughout this belt the farms are small, and the rural population is dense and the keeping of dairy cows is exceedingly common because of its fertile soil, cool humid climate, dense population owing to the presence of large indus-

trial centres, the inability of agriculture to stand competition from the newer agricultural lands of America and Australia. This region is mainly the milk and butter producing region.

Holland has long been famed for its cattle. The meadows are made of rich mud that the Rhine has brought down from the fertile highlands of the Central Europe.

These moist, rich lands too wet for cultivation, make pastures of great richness. Here the drainage ditches separate from each other the little green fields, dotted with feed boxes from which the cows eat bran and grains imported from America. In damp and cloudy weather the cows are blanketed in the pastures. These richly fed and carefully tended herds of well-known Frisian and Holstein breed give abundant quantities of milk, which makes the dairy products the chief of all the farm produces of Holland.

Dairy farming forms an important industry in Denmark, where the chief product is the butter. The land here is usually sandy and was originally infertile but by good care and imported fertility in the form of cow foods it has been turned into fertile land. Considerable quantities of grain are imported from America and Argentina to feed the cattle. As a result, Denmark with a poorer soil rivals Holland in having more farm animals for its area than any other country of the world; there are more than thousand factories for making butter; the cows are inspected once a month to ensure healthy stock. There are several thousand associations for butter which satisfies the productivity of the milk cattle and that only the butter which satisfies the tests laid down by the Government is allowed to be exported. The local supplies are in excess of the home consumption and hence large quantities are exported to Great Britain, where it not only competes with the New Zealand and Australian butter successfully but also gets a premium over the butter imported from these countries. Through careful catering to the demands of the market, Danish butter preserved in tin cans has become the standard article of consumption in tropics and in all remote corners of the globe where there is no local supply.

The dairy farming is also carried on to a very large extent in northern and western Germany but large population leaves no exportable surplus despite the fact that dairying here is carried on in its most intensive form with the cows kept in barns and food brought to them.

In Central Europe the dairy cattle are reared on the grasslands of the Alpine pastures in Switzerland where large areas produce an abundance of grass owing to the melting of snow. While on the lower slopes they often helps to fertilise and irri-

gate the grass for winter pastures. Switzerland has an interesting and unique dairy farming, from where are exported sweet butter, cheese, condensed milk and milk chocolates throughout the world.

The North American Region. In North America the chief dairying areas lie to the south of Great Lakes and along the upper St. Lawrence valley. The concentration of the industry in this region is partly accounted for by the cool moist climate favourable to the production of the pastures and partly by the fact that dense population provides a ready market for milk and dairy products. Moreover, owing to the unsuitability of the area for general agriculture due to the hilly topography of the country a large majority of people are attracted to dairy industry.

In U.S.A. there is an increased supply of milk than the home requirement partly because of the wonderful improvement in the milking capacity of the American cows, which are reared in the eastern states where agriculture does not find it easy to stand the competition from the more favourable lands situated to the west. The surplus milk is, therefore, converted into cheese. Thus the districts of New England, Southern New York, and Pennsylvania supply the large eastern cities with milk and south-eastern Wisconsin and northern Illinois do the same for Chicago. Northern New York State, the lower St. Lawrence valley, and much of the central and northern Wisconsin are noted for cheese manufacture. The high eastern prairies of the Canadian sea-board including Nova Scotia, New Brunswick, Prince Edward Island, Ontario and Quebec have all rich pastures which support large number of dairy cattle and hence the greater production of dairy produce—particularly butter and cheese. The provinces of Quebec and Ontario have over 4,000 factories for the manufacture of butter and cheese. Canada supplies 3% of the British need of butter and 32% of the cheese.

Forms of Dairy Produce. Modern dairy regions tend, because of geographic conditions and economic relationship to markets, to specialize in milk, butter and cheese. The fresh milk, because of its perishability centres about the great city markets or in such localities as have rapid transportation to great cities. This industry is particularly important in New England, eastern and southern New York, parts of New Jersey and eastern Pennsylvania.

In regions most disadvantageously situated with respect to large markets, milk is more profitably employed in the manufacture of condensed milk, cheese and butter. These products are easily handled, and the elements of time and cost are not large factors in their marketing because of their high value and relative imperishability. The manufacture of cheese is concen-

trated in the cooler parts of the intensive dairy belt. Cooler summer temperatures and short hauls make it possible for farmers to deliver milk at cheese factories in more uniform good condition.

"The growth of city population in the U.S.A., requires ever larger supplies of fresh milk; about 45 percent of the total milk produced is now consumed in that form. About 35 percent is made into butter, while condensed evaporated and dried milk requires about 5 percent of the total, ice-cream about 3 percent and cheese manufacture, about 6 percent. Some is fed to livestock or wasted."

The Australian Region. Australia has extensive pasture-lands upon which the cattle are reared both for beef and dairy. The dairy cattle are chiefly the *Shorthorns*, *Ayrshire*, or *Jerseys* and are small in comparison with huge beef cattle of the interior.

Here the coastal dairying belt extends from north Brisbane through New South Wales to Gippsland and Victoria. The dairying can be carried on with reasonable safety in this coastal belt where the rainfall exceeds about 40" in the warmer latitudes and 25" in Victoria. Nevertheless, the silo for storing fodder is an important feature of the farms on which dairy cattle are kept, and large quantities of hay are grown. Factories for butter and cheese making are scattered through the dairying districts, and there is export trade in butter, cheese and condensed and dried milk.

In neither South Australia nor Western Australia is dairy firmly established on commercial scale. In these States the temperate districts with a good rainfall suffer from summer drought and therefore, are climatically less well suited than the south-east for dairying purposes.

The numerous short coastal rivers of south-east (where there is no well-marked dry season) are very favourable to this occupation. Irrigation has made possible a considerable development in dairying. The keeping of the dairy cattle based upon the growth of fodder crops—lucerne—is an almost invariable accompaniment of irrigation and in such districts co-operative methods are facilitated by the relatively small size of holdings.

Since the beginning of this century the production of butter and cheese has more than doubled. The high quality of Australian butter is attributed among other things to the sunny open air conditions in which the cows graze all the year round and to the careful supervision of the production at all its stages.

New Zealand leads the list among the dairy producers of the British Empire. The reason for this is that New Zealand

enjoys certain advantages which make its pasturelands excellent for rearing milk cattle. Fertility of soil and mild climate give New Zealand very rich and abundant pasture while the hilly topography of the country and wet climate in these wet cool temperate latitudes make agriculture unfavourable.

The most outstanding dairying area is found in the Taranki lowlands but the Thames and Middle Waikato lowlands and the Central area are all very important and the industry is making rapid strides in the Auckland peninsula. In south Island the most important dairy districts are found round Christ Church on the Banks and Otago peninsulas.

State encouragement, scientific breeding, co-operative methods, the milking machines and careful grading have combined to give the reputation which is enjoyed by New Zealand dairy products but this great industry was dependent upon the coming of refrigeration both for storage and transport. As a result of favourable conditions and an energetic and long-sighted policy at all stages of production and marketing, the dairy industry has almost caught up the sheep industry in value it contributes to the export trade.¹⁸ Everything possible is done to maintain the quality of the animal. New Zealand farmers rank with those of Denmark. In New Zealand the mild climate allows cattle to remain out of doors all the year round and thus it is unnecessary to construct barns and other outbuildings for winter shelter. The cows are milked by machinery, whose use enables two or three men to deal with about a hundred cows, twice a day, in some three hours. On the majority of New Zealand farms the milk is first separated by hand-separators—the skim milk is used for feeding calves and pigs and the cream is sent to the co-operative factory. The dairy farms are comparatively small and the farmers have learned the value of co-operation which does much to reduce overhead charges.

New Zealand butter is packed in boxes each of which contains 56 lbs. It is kept in freezing chambers until it can be shipped into the cold storage rooms aboard steamers. The butter and cheese are carefully graded and stamped with the "New Zealand produce", Government mark. Butter forms the leading export but very large quantities of cheese are also exported besides the condensed and dried milk.

In addition to the people actually engaged in dairying many others are employed in subsidiary occupations. Some grow barley, oats, and root crops and hay all of which provide food for the stock. Scientists work in laboratories testing milk and finding out how to improve the standard. Some manufacturers

¹⁸ L. S. Suggate, *Australia and New Zealand* (1933), p. 337-38.

make dairy machinery, others manufacture paper for wrapping and boxes for packing purposes and countless people are employed in the distribution.

International Trade in Dairy Products. As will be clear from the foregoing discussion the dairy produce consists mainly of the milk, butter and cheese. The milk is the most important of all these produces for it contains valuable vitamins essential for the balanced diet of the adults and more especially of the children. But it is dangerous because of the ease of contamination in its collection and the further fact that it is a perfect germ culture. Cheese is a condensed form of milk and butter is a fat. The U.S.A., Switzerland, Canada, Denmark, Netherlands, France, Norway, Australia and Ireland are the principal milk exporting countries while Great Britain, U.S.A., Germany, East Indies, Cuba, Switzerland, South Africa, Japan are the principal importers of milk.

Butter of annual value of £ 60,000,000 enters the world trade. The chief exporter of butter is Netherlands followed by New Zealand, Australia, Ireland and Argentine, Russia and Italy, while American region, western Europe, United Kingdom, and Germany are the principal importers.

Cheese is exported from Netherlands, New Zealand, Canada, Switzerland, France, and Denmark while the chief importers are U.S.A., Germany and United Kingdom.

The consumption of milk, owing to its perishable nature, is largely confined to producing regions and adjacent cities. Derivative products such as butter, cheese and condensed milk and evaporated milk do not deteriorate so quickly as white milk, therefore, they are better suited to international commerce. The aggregate value of international trade in dairy products is in the neighbourhood of half that of sugar and somewhat less than half that of wheat.

It must be remembered that cheese, butter and various classes of whole or processed milk move from the periphery of highly industrialised regions to thickly populated manufacturing centres. Netherlands are the largest exporter of milk, Denmark of butter and Netherlands of cheese. This fact is further shown by the following table:—

Dairy Regions	Milk percent	Butter percent	Cheese percent
N.W. European Region	74	62	41
N. Eastern American Region	22	—	18
Australian & New Zea- land Region	2	26	26

Dairy produce yields foods of high nutritive value. The following table gives the average annual consumption of milk and butter per head in certain countries:—

Countries	Butter Milk (Gallons)		Equivalent in Butter Fats. (lbs.)
	(lbs.)	(lbs.)	
New Zealand	40.0	25	42
Australia	28.9	22	32
Great Britain	21.0	18	24
Canada	30.5	47	43
U.S.A.	17.75	46.6	33
Denmark	12.2	48	37
Sweden	18.5	48	42

The largest per capita consumption of milk, butter and cheese is to be found in Sweden, Denmark, Switzerland, Germany and U.S.A.; smaller amounts of milk and its products are consumed per capita, by the British and the French and still less amounts by the Spanish peoples in Southern Europe and the inhabitants of less populated countries in the New World, such as Argentina, Brazil and Chile.

Sheep Rearing in Australia. Australia is the chief sheep producing country in the world and the leader of wool exporters having about 114 mi. slope. Sheep are the main source of wealth of Australia, representing a fifth of the world's sheep. Most of her sheep lands are situated in those parts of the temperate grasslands that are too dry for cattle. Thus the dry climate and the wide grasslands of the central area extending in the west of the mountain barrier parallel to the coast, are the finest sheep reared up. The large developments that can take place in sheep rearing with the aid of only a few men—a very important point in the opening up of a new and remote region is yet another reason for the sheep rearing here. Further, the rather poor grazing of the plains, salt bush, etc., was suitable for sheep. Sheep thrive best where the rainfall is from 10 to 20" a year, but they do not do well where temperatures are too high and so they are rarely bred extensively in the Tropical regions, except above high sea level, because they are liable to foodrot and other diseases.

Environment and Sheep. In the elevated area of the eastern highlands fine wool is produced but the cold conditions in winter tend to make for undernourished sheep. The open plains produce larger and more vigorous sheep, but the heat and dust has rather bad effect on the place. Victoria and Tasmania are

well suited for the production of attractive wool. In the hotter parts of Queensland the wool deteriorates unless the stock are continuously improved by breeding with vigorous rains imported from the south. In south Australia the dry condition produces wool defective at the tips but even with a rainfall as low as 14" the sheep are very vigorous. In Western Australia the strong-wooled breeds meet the hot conditions better²⁴

"The limits of the sheep are due primarily to the temperature and rainfall, which in turn react on their food-supply. In the south-east the sheep isopleths are parallel to the isoyets as shown in the following table:—

	SHEEP AND RAINFALL		Chief Districts.
	Optimum (in)	Limits (in)	
New South Wales	20-30	10-40	New England and Western slopes.
Queensland	15-22	10-40	Longreach, Darling Downs, Maramoa.
Victoria	20-30	10-15	Hamilton, North East Slopes.
South Australia	20-30	5-30	Mount Gambier, Adelaide.
West Australia	15-30	8-35	Sivanland.
Tasmania	20-30	20-60	Central East.

Since sheep stations are so characteristic of Australian life, the following account will be of interest. Sheep run or 20,000 acres in Queensland needs a capital of about £ 5,000 for expenses as follows:

Fencing 16 miles @ £ 50 a mile	£ 800
Hut and Sheep Yard	90
Wool Shed for fine shears	75
Wool press £ 20; wagon £.15	35
Eight Houses	200
Bore for Artesian water	1,000
House and Out buildings	600
3,500 ewes @ 6\$ 6d.	1,312
2,500 wethers @ 6\$ 6d.	812
Sundries.	130
	£. 5,055

²⁴ G. Taylor, *Australia*, p. 309.

Australia is unfortunate in the arid nature of much of her territory and also in irregular character of the rainfall. Droughts sometimes last for long periods, cutting off both grass and water so that the sheep starve by millions. The great dependence of the flocks upon rainfall and rainfall fluctuations is shown by the observations of Hann, a scientist, who says that with 10" of rainfall per year, an Australian plain will support 10 sheep per sq. mile with 13" of rain, 20 sheep and with 20" of rain seventy sheep with less than 10" of rainfall; the land is of no value even for pasturage. In many places the uncertainty of rainfall has partially been overcome by boring artesian wells, and partly by improved transport, which enables sheep to be moved away from areas of drought. In some districts the difficulty of being overcome by the recent practice of discontinuing wheat culture in richer area, e.g., river flats newly cut into silos and fed to the sheep when required rainfall has partially been overcome by boring artesian wells. In this way a moist succulent food is available when drought prevails and sheep farmers are to some extent safeguarded against the risk of a recurrence of the diseases suffered by them a few years ago.

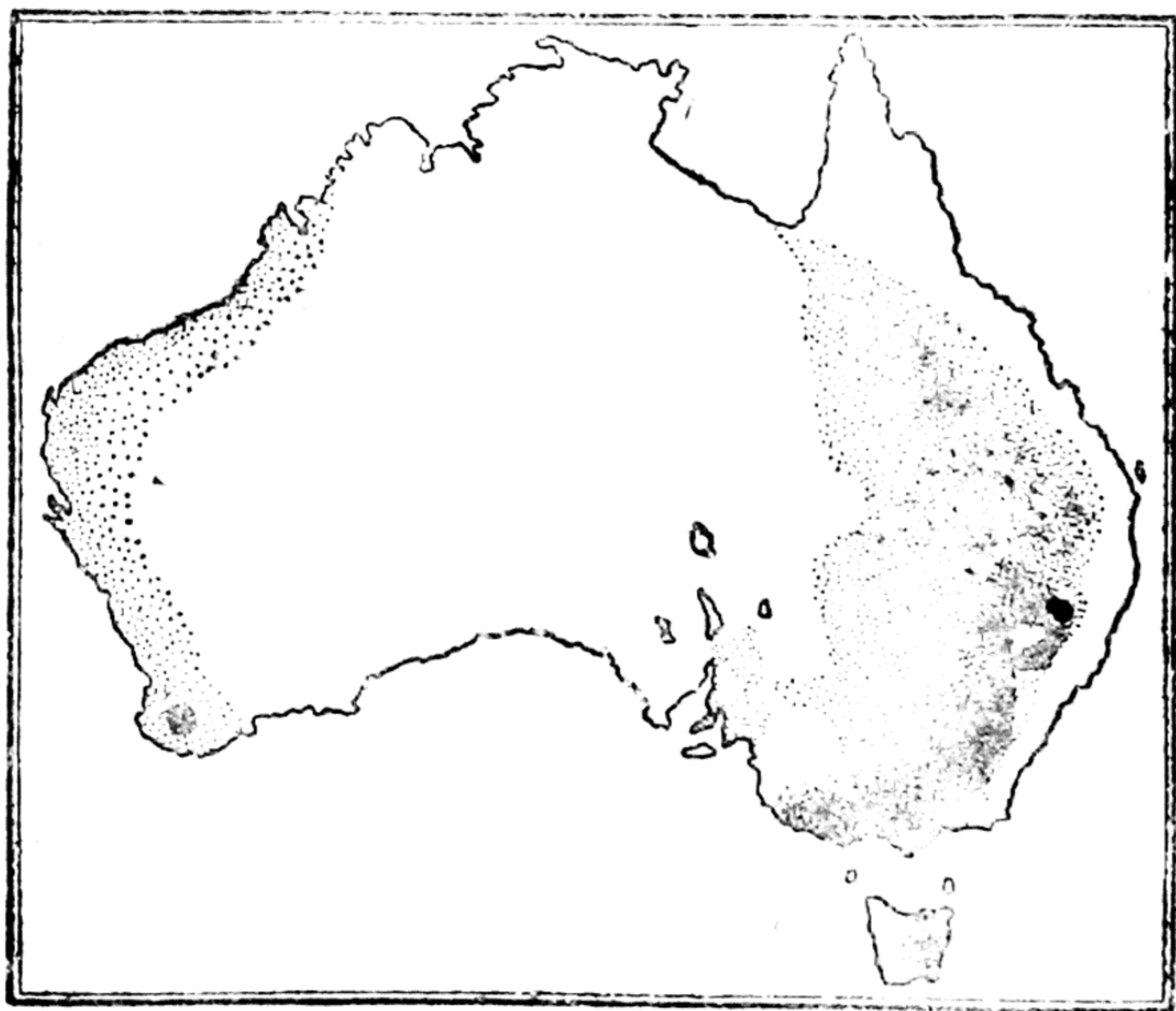


Fig. 23—Distribution of Sheep in Australia

The sheep area extends into the tropics, especially into the big artesian area of Queensland. But the main sheep belt lies on the lower side of the Eastern Highland stretching from the Murray Basin northward to Central Queensland. New South Wales possesses nearly half the sheep of Australia. While Queensland with more rain and heat and better forage has about $\frac{1}{4}$ of the sheep. South of New South Wales is Victoria which lying far enough from the Equator has better pastures but only $\frac{1}{3}$ as many sheep. "The Australian State with the greatest number of sheep per square mile is New South Wales, where there are on an average twenty-one but in New Zealand this number is far exceeded with an average of 280 to the square mile." One of the most famous breeds of domestic sheep the Merino is noted for the amount of wool it produces. The merino was introduced from South Africa, but the Australian climate has so suited it that the Australian merino now produces much finer wool than the South African type. The Australian farmers breed sheep for wool rather than for mutton hence this breed is not particularly good for yielding mutton, and so in many regions it has been crossed with smaller English type thus producing a variety which while still yielding good wool, also produces a good mutton.

Spring is the busy time for the sheep farmer, for then the animals are sheared. Shearing is specialised work, on up to date farms it is carried out by machinery and a skilled machine shearer can shear some 350 sheep in about 8 hours. Shearing starts in August in the hot north (Queensland) countries till October in the cooler south (Victoria). After shearing time the wool is sorted and packed in bales to wool markets of Sydney, Melbourne, Geelong,¹⁹ Ballarat, Brisbane and Albany. Camels, oxen, horses, barges and lorries carry the wool here.

The introduction of the refrigerator revolutionized sheep farming in the countries of large-scale production. Before this time their exports were chiefly confined to wool, but with the introduction of cold storage Australia, New Zealand and other lands soon established a vast trade in frozen mutton and lamb. By-products play an important part in sheep farming. (1) Sheep skins are tanned for leather (2) the horns and hoofs are used for buttons, (3) the fat is turned into tallow for soap and candles.

¹⁹ In New South Wales shearing extends from July to December and in Victoria it begins in September. In Western Australia the spring is the chief shearing season from middle June to end of September. The shearing place is graded in the sheds by 'wool classes' who take special note of length and fibre of the wool, and of the amount of grease. Then the classified wool is compressed into cubical bales in the wool press. Each bale is contained in jute cover, and weighs about 300 maunds.

(4) trimmings of the skins are sent to glue factories, and (5) from the intestines sausages are made.

Methods of Care. Where the sheep are kept upon the open plain there is a special method of caring for them. Owing to the defenceless character of these animals they require constant care and may not be allowed to shift themselves. In all regions of large sheep production the method of caring for them is much the same. The herder (squator) with a couple of dogs and a pair of horses takes a flock of one to three thousand sheep and follows them for days and weeks. The sheep dogs are much more skilful helpers in driving them than men could be and the herder's rifle protects from wolves, foxes and dogs, while the flocks are commonly put into corrals or fenced enclosures at night.

Breed. The merino type predominates with various sub-types adapted to different climatic and pasture conditions—a large type being associated with the plains and a smaller breed with the highland pastures—other breeds such as Lincoln, Leicester, Romney, Marsh, Shropshire and Southdown, are found in the more closely settled as distinct from the more specially pastoral areas. They are crossed in increasing numbers with merinoes for the mutton and lamb trade. Crossbreed of Lincolns or Leicesters gives both good fleece and good carcasses. For fat lamb production rams of Dorset, Shropshire and Southdown breeds are usually employed. Crossbreeds for mutton are also largely reared in the highlands where rainfall is substantial.

Sheep Rearing in New Zealand. New Zealand with the good rainfall of the prevailing Westerlies is an excellent sheep country. Some of the mountain pastures upon the western coast of New Zealand, continuously wet from exposure to the sea-wind have such splendid grass that they can support sheep per acre throughout the year. The coarser native grasses have largely been replaced by better European types (Alfafa or Lucern). Sheep rearing is carried on chiefly on the Canterbury plains and on the drier eastern plains of North Island. The sheep reared are mainly of the smaller varieties, which produce both good wool and good mutton, a special breed being the Corriedale, a New Zealand type developed from Merinos and the English Romney Lincoln type.

New Zealand has a large export of wool and frozen mutton the best known of the latter being the famous "Canterbury lambs". The good pasture and regular food supply of New Zealand causes the frozen mutton of that country to be considered the best that is imported into England. The sheep are often fattened by being turned into large fields of turnips from which they first eat the tops and then the entire roots and mutton can

be produced at a cost so low that it often competes in British markets with the American grown mutton.

In New Zealand the shearing begins in lowlands about the end of October and machinery is generally employed for this work. The wool provides normally the most valuable single export and finds its market chiefly in western Europe. The mutton and lamb provide another large export. The trade is carefully regulated and the meat is graded by the officer of the Agriculture Department.

Before the days of refrigeration wool, tallow, hides and skins and sundry products were the only products of the pastoral industry that could be marketed overseas. Refrigeration added meat, butter and cheese to the list and brought with it settlement and development and the employment of large numbers of drovers, shepherds, shearers, slaughtermen and other workers. There are many freezing works while other dependent industries include butter and cheese making felt, monger and wool scouring tanning, boiling down and manure making.

The moist conditions of the North Island as well as parts of South Island have led to the popularity of Romney marsh breed very hardy and resistant to foot-rot. This sheep has been vastly improved by careful breeding and it is noteworthy that among the pure-breed and in Dominion of New Zealand this type predominates.

CHAPTER 7

OCCUPATIONS OF MAN (Contd.)

5. PRIMITIVE CULTIVATION & MINING

In the tropical forest regions and upon their Savanna and high land margins are vast areas of land which are used for agriculture in a rudimentary way. In the low land areas abundant heat and moisture have given rise to a luxuriant natural vegetation, but they also promote luxuriant weeds once the original vegetation is cleared away. These are mainly the regions of the tropical red soils whose store of fertility is quickly exhausted under continuous cultivation without skilful management. This the primitive farmer cannot provide and he is forced to adopt a system of cultivation that requires new lands for temporary exploitation. The inhabitants of some of these regions live under tribal organisation, and in their agricultural adaptations to their surroundings they act in tribal groups.

Among the various rudimentary systems of culture two general types may be recognised. The first involves the clearing of fields in the forest, their tillage for one or more years in simple subsistence crops, such as manioc, until weeds or soil exhaustion force their abandonment. This continues until all the available field sites convenient to all settlements have been used. Then the entire group moves to a new site and establishes a new village settlement in a locality far removed. The old site quickly reverses to forest, and after some decades it may again be cleared as new land in a process of slow rotation during which the soil recovers some of its elements of fertility and the troublesome weeds have been crowded out by forest growth. This system is sometimes called *shifting cultivation* or *milpa* cultivation. In our country it is very prevalent in Assam hills, and generally known by the term *Jhum*. The second type is slightly more advanced and commonly is found in tropical forest localities where the population has become somewhat more dense and especially among such groups as have some contact with the world outside and some sale for the products of their cultivation. In this system the fields are cleared of their original cover, cultivated and abandoned as before, but the village seldom is moved. This system requires a more frequent reusing of abandoned fields and a considerable intensification of the agricultural practices, the labour for which is provided by the larger population. Tree crops, such as palm nuts and coco, are sometimes planted in the abandoned clearings. From the land thus planted its reversion to forest is delayed or prevented. This is a rudimentary form of settled or sedentary agriculture.

The tribal farmers who till by these methods live in huts

that are built of local materials. They have few livestock other than poultry and but little understanding of land fertilization or other advanced agricultural practices. They are able to clear new land by means of axe and fire, but their methods are not intensive. The larger part of the regions that are characterized by rudimentary tropical tillage are exceedingly remote from routes of transportation, and the products of their cultivation are for subsistence only. A smaller part only produces some crops for sale, and mainly they are the tree crops. Most of these areas are mainly within the tropical rain forests. Only in parts of Africa, where infectious diseases prevent the keeping of horses or other work animals, does the rudimentary type of tropical tillage extend much beyond the forest and scrubland border.

A related form of rudimentary agriculture is practised by the highland Indians of Central America and the Indian regions. They clear and till small fields on the mountain and valley slopes, and these, when the soils are depleted or badly eroded, are allowed to revert to pasture or bushwood. However, the settlements of the cultivators remain fixed or are moved only at long intervals when no more land is available within reasonable distance. Although these agricultural practices are rudimentary in form and similar in type to those noted above, the crops are different from those of the adjacent lowlands owing to the lower temperatures of mountain climate.

6. INTENSIVE CULTIVATION

In south-eastern parts of Asia, there are ancient centres of civilization in which agricultural skills and implements long ago made it possible to support many more people per unit of area than is possible under rudimentary cultivation. The further growth of population required ever increasing intensity in the use of agricultural resources and gave rise to distinctive systems of tillage. Principally they are of the subsistence type, only a small part of the farm produce being sold away from the locality of its production. Most of the readily tillable land is used, and additional areas are created at great labour through land drainage and the terracing of hill sides. Only the steepest slopes and the least productive soils remain in woodlands or pastures, but in some hilly districts woodlands occupy a significant part of the total area, nearly two-third in Japan, for example. The animal industries are only moderately developed, since the major part of the land, and especially the crop land, is required to produce cereals and vegetable for direct human consumption. In this respect, however, parts of the Asiatic region differ because of contrasts in religious tolerance. In China and Japan there are relatively few cattle and sheep but many swine and poultry that

can be supported from the agricultural and household wastes. Even ponds and streams are made to yield their maximum of food through the cultivation of fish and water fowl. In India, on the other hand, religious customs forbid the use of flesh, and there are no swine or other animals used for food. There are, however, many cattle, water buffalo, and goats. These are used to pull the ploughs much more extensively than in China, where hand labour predominates, or as sources of milk and other animal products. There is another significant agricultural contrast between parts of the general region of intensive subsistence cultivation. In the more rainy tropical and sub-tropical portions the cropping system is dominated by the growing of rice, all other cultivated crops take place subordinate to this most productive of central grains.. Rice occupies the irrigable deltas, flood plains, coastal low lands, and terraces. Other grains occupy unirrigated lands, replace rice on the irrigated land in the cooler and drier regions, after rice harvest. In the more, tropical portions, where the growing season is long, multiple cropping enables two crops of rice to be harvested, which, together with beans, vegetables and other crops, provides food for large number of people. These live in innumerable farm villages and till their tiny fields with endless patience and hard labour, but seldom do they achieve more than a bare existence. There are various other cereal grains, especially wheat, corn, and millets, take its place, in more northerly portions and interior highlands of China and Japan and the dry interior of India, where summers are either too short or there is not sufficient water for irrigating the rice fields. They are associated with beans, vegetables and many other crops, such as cotton. The major areas of rice dominance are mainly in the Old World, and most of them are densely peopled oases.

7. PLANTATION CULTIVATION

It is a native of tropics, and in some areas closely associated with the rudimentary and subsistence forms of tillage. Its purpose is the production of single crop or limited group of crops for cash sale. They are produced on an extensive scale by efficient methods and in standard forms. The products most susceptible to this type of management are certain world staples that are required in large quantity, mainly in the industrial regions of the northern hemisphere. Such are bananas, tea, rubber, sugar, cloves, cincona and certain tropical fibres. The choice of plantation site is made with reference to its ability to produce one of these commodities in large quantity and of superior quality, and hardly any other crops are grown. The capital for plantation development, the skilled personnel for its management, the machinery for its operation, fertilizers for the crops, part of the food for the labourers, and sometimes even the

labourers themselves are brought from outside the locality, and some of them from the farthest parts of the earth. On many plantations the labourers live in village settlements at the plantation centre and work in gangs under supervision. This is notably true of rubber and tea plantations.

Like other agricultural staples, the products of plantation agriculture suffer from competition on the world market. There are few crops so restricted by nature that they cannot be raised in more than one region. Moreover, the great plantation establishments, once they have created a large market and have demonstrated efficient methods of production, begin to find competitors in the small farmers of their respective regions. Some crops such as sugar and cotton once were produced, and still are to some extent, under plantation system of management but now are grown even more largely by a modified plantation system or by independent small farmers. The United States cotton region is an outstanding example of this change. Similar if less extensive changes have taken place in the Cuban sugar industry, the Brazilian coffee industry, and others. In fact, small commercial farms prevail over considerable parts of these regions, and an almost complete transition is to be found between the highly centralized plantation on the one hand and the small cash product farm on the other. Those plantations tend to resist longest the effects of private competition whose products are of such a nature that they require some kind of special handling or expensive processing or standardizing between the field and the shipping point, things the small farmer is unable to provide.

8. MEDITERRANEAN AGRICULTURE

Although Mediterranean agriculture is not distinguished on quite the same basis as the other types, it is an ancient association of cultural and natural features well recognised by geographers. The unique combination of dry subtropical climatic feature together with hilly land surface is, in each region of its occurrence associated with a distinctive combination of crops and livestock industries, although the relative importance of the several component cultural elements is not everywhere the same. Cereal grains, especially wheat, grow during the mild, moist winter and mature with the coming of the dry summer. Certain other crops that are sensitive to low temperature are native to the regions of Mediterranean climate and find there the freedom from severe frost necessary to their growth. Such are the olive tree and the grapevine. They have deep roots that seek underground water, which enable them to endure the summer aridity and produce their fruits at the end of the dry seasons. Still other crops of humid tropical or sub-tropical origin have been introduced into the Mediterranean region by man. They find there the mild winters they require, but they are not natu-

rally adapted to the summer aridity and are able to survive only where they are supplied with water by irrigation. The citrus fruits are the outstanding example of this group of crops. However, where irrigation water is available it is often supplied to other crops also, including some such as grapes and olives, which will survive without it but are much improved in yield and quality if they receive supplementary irrigation. Other irrigated crops include vegetables, sugar beets, and alfalfa for hay and pastures. The irrigated land is used most intensively and is held in small farms that receive careful tillage and have a large investment of capital and labour per acre. It also yields large returns. However, only a comparatively small part of the total area of the Mediterranean regions is capable of irrigation, either because it is not physically suited to that use or, more commonly, because there is not sufficient irrigation water available. The larger part must produce cereals or unirrigated tree crops or is used as native pastures. Since most of the Mediterranean climatic regions include areas of hills and mountains these are used mainly as grazing lands, and they occupy much the greater part of the total area but support only a small part of the population. The dry summer pastures do not supply forage adequate for many cattle or horses but are much better adapted to the use of goats and sheep, which are the most abundant types of livestock kept there.

The world regions of Mediterranean agriculture are, of course, practically coincident with the climatic regions of that type. However, the agricultural emphasis varies considerably among these regions owing to differences in historical background, density of population, accessibility of the markets, and other cultural factors. In California citrus and deciduous fruits, vineyards, and vegetable crops are paramount. The industries that supply oranges, raisins, wines, peaches, figs, and other intensive crops are highly organised on a commercial basis, and they have a large national market available and the means of transportation with which to reach it. In the distant Mediterranean districts of Australia there is an even larger area of tillable land, but the supply of irrigation water is less abundant, the domestic markets are small and the distances to outside markets great. Hence the more easily transported products of the wheat farms and the sheep ranches have a higher relative importance there. In fact, both the regions of Mediterranean agriculture in the northern hemisphere have larger nearby markets, whereas those of Australia, Chile, and South Africa find no comparable outlets for their more perishable products. Notwithstanding these differences, the basic agricultural elements of all the regions have a striking similarity and warrant their inclusion in one of the major types of agricultural regions of the world.

9. COMMERCIAL AGRICULTURE

Commercial grain farming like plantation culture is a product of the modern industrial era. The two are alike in some respects but very different in others. The commercial grain farm, like the plantation, usually puts an emphasis upon some one crop that it produces for cash sale. It is, however, unlike the plantation in its organisation. It does not require a processing plant or even storage facilities, since the grain goes directly from the field to the market. It does not have gang labour, outside management, or foreign capital. Except in the communal farms of Russia, it has no workers' village, but instead has dispersed farmsteads of rather small size and unimpressive type. The commercial grain farms average large (320 to 640 or 1000 acres in the wheat regions of the U.S.A.) and mainly they are operated by their owners or tenants on an extensive basis, with a maximum of labour saving machinery. The farmer supplies the management and, with his family and a hired hand or two, furnishes the labour, except for temporary help at harvest time. Wheat is usually the principal crop of commercial grain farms, but it is not the only one. In some districts corn, barley, rice, or flax seed are raised for sale. Generally there are also secondary crops of hay, oats, and other feed crops for the farm animals. The number of animals kept is not great in proportion to the size of the farm. More important are the horses used to pull the numerous and large tilling, seeding, and harvesting machines, but in some areas tractors have taken the place of these to a considerable extent. Other livestock are kept to furnish a domestic supply of milk and meat.

Commercial grain farming is found principally on the steppes and prairie margins of the middle latitudes, especially in the plains regions of chernozem soils. Because the rainfall is low the yields of grain average low in spite of the fertile soils, but for the same reason the land is relatively cheap. The farms being large, the farmsteads are widely spaced. Having few livestock and little need for grain storage, they have few barns, and hence the farmsteads are unimpressive when compared with those associated with certain other types of middle-latitude farming. In fact the whole landscape with its absence of woodlands, its large fields and widely spaced farmsteads, is one of peculiar openness. On the semiarid margins of some of the commercial grain farming regions part of the crop is raised by *dry farming methods*. These are agricultural practices designed to conserve moisture by storing up in the soil part of the rainfall of more than one year, in order to produce a single crop. Thus the land is cultivated each year to make it permeable and retentive of moisture but is cropped only in alternate years.

This type of farming is expensive in terms of labour, considering the possible returns, but it utilizes cheap land. It is particularly suited to grain farming because such crops as wheat and barley have relatively small water requirements.

The world regions of commercial grain farming are distinctive of regions of European rather than Asiatic type of civilization. They occupy the new and relatively cheap lands of the world, and most of them are bordered on their drier sides by regions of livestock ranching. In part they are regions of winter wheat culture, as in Kansas, Argentina, Australia, and the Ukraine, colder areas raise mostly spring wheat, as in southeastern Russia, Western Siberia, the prairie provinces of Canada, and the Dakotas. Some specialize in grains other than wheat. For example, corn is grown primarily for sale from the farm in a large district in eastern Illinois, also in the northern part of the Argentine grain region, and in the Transval and Orange Free States of South Africa. Rice mainly a subsistence crop in the Old World is grown entirely for sale under the American system of culture found in California and Louisiana.

10. MIXED FARMING

This name may be applied to a mixed type of agriculture in which some crops are grown as feed for livestock, some for cash sale, and some as food for local consumption. The relative importance of these three functional elements varies from one region to another. In all the regions the production of livestock is highly important, but in some it is practically the only source of cash income. The mixed farming regions may in fact be divided into two types: (a) those in which crops and livestock are raised mainly for sale and (b) those in which they are produced mainly for local use. They may be called the commercial and subsistence types respectively.

The commercial type of crop and livestock farming is best exemplified by the American corn belt, where crops are raised mainly to feed hogs, cattle, and sheep, which are sold from the farm and are themselves the principal source of cash. Relatively little grain or other crops are sold from the farm and even less is used for direct human consumption. In the western European region the emphasis is more evenly divided. The significant feature of this type of farming, however, is that it is organised upon a commercial basis and that it has usually more than one source of cash income but with one of them commonly predominant. In general this type of farm is more versatile than the cash grain type, and this in turn implies regions of better climatic endowment, particularly more abundant precipitation.

The farming system of the commercial crop and livestock type varies considerably among the regions. It has, however,

certain distinguishable features. Outstanding is some sort of rotation of crops that employs a succession involving (a) a tilled crop, (b) a small grain, (c) a hay crop, and (d) rotation pastures. Thus, in the American corn belt the principal tilled crop is corn. the small grain is likely to be oats or wheat, and the hay crop alfalfa, clover, soyabeans, or grasses. The American corn belt, the Argentine alfalfa belt, and various districts in France and Germany are noted as centres of livestock feeding.

The farms of productive regions are averagely small than those of the commercial grain farming areas. But here the manner of tillage is much more intensive, involving more investment, more labour; and a larger use of fertilizers. It is more expensive land, and the typical farm has larger and more expensive buildings to house animals and crops. The farm buildings in the Central European mixed farming region also are large. The subsistence type of farming is generally restricted to middle latitude regions and especially to those that are remote from modern transportation routes. The largest region of this type is in central and eastern European Russia, where distances are great, railways and roads are few, and the farming system derived from a very old form of peasant agriculture. In that region rye and oats replace the wheat and barley that predominate in the commercial grain region of southern Russia. The rye and oats mainly are consumed locally rather than sold on the market. Other important subsistence crops include large quantities of potatoes and cabbage and some other vegetables. The livestock density is not high but cattle, swine and sheep exist in moderate numbers and contribute to the local food supply. Horses are used for farm labour. Many of the Russian peasant farms have been collectivized under the Soviet regime and doubtless the subsistence type of agriculture is being broken down, especially near the growing manufacturing towns of the Moskova and Ural industrial regions, which furnish new markets for produce. The farmers of this region live mainly in villages. Their principal construction material is logs, and their barns and other farm buildings are fewer and simpler than those of the commercial mixed farming districts of Western Europe. Subsistence farming produces very little cash income with which to buy improved equipment.

Other regions of subsistence crop and livestock farming are small and less clearly defined. The isolated Russian settlements of central and far eastern Siberia have borrowed their characteristics in part from old Russia and may be considered similar in agricultural type. There are few such districts in Anglo-America, except possibly in parts of southern Appalachian high land and maritime Canada, and they are small. In the high lands of Mexico and in central and south America subsistence

of the ancient Indian type has been modified by the introduction of European animals. However, in most of these districts the animals do not belong to the people who till the soil but to great ranch owners, although they may be tended by the humbler folk. In the central plateau of Mexico this is not true to the same degree. The cultivators of the productive basin lands also are the owners of donkeys, cattle, sheep and goats which graze the dry hill slopes and furnish labour in fields, a little meat, a little milk and some wool to their owner. These farmers like those of Russia, live mainly in village settlements, have simple houses and few barns or other structures and little in the way of mechanical equipment. They remain peasant farmers and practically self-sufficing. The Mexican plateau may therefore be classed as a region of subsistence crop and livestock farming. A similar condition prevails in the plateau region of south western Asia, especially in Turkey.

11. HORTICULTURE

Another form of agriculture which depends upon the existence of the great urban market is concerned with the supply of vegetables and fruits, both in and out of their usual season. These industries are normal part of the Mediterranean agriculture, but they are found in other regions also. The greatest markets are those of industrial Europe and North America. In these regions are millions of people who have no time or land for gardening but they have cash incomes with which to buy horticultural products. The great population centres of the East, being more largely agricultural, supply themselves during the usual season and go without during the balance of the year.

The vegetable and fruit crops are the produce of highly intensive cultivation. The land area utilized is relatively small, but it is made to yield an astonishing quality of food. It is heavily fertilized and tilled with a great expenditure of labour. The farms generally are small; and the nature of the farm operations does not require large or numerous buildings. These farms supply vegetables and fruits of large variety.

12. MINING

Mining is an industry in which minerals are extracted from the womb of the earth for the use of man. Though it has its roots in the hoary past, but remained unwanted and undeveloped as it never served the primary needs of the people. It is particularly since the days of industrial revolution that mining have assumed an unparalleled importance because making of machines, implements and tools largely depends on the minerals. Besides, minerals are also used in very large quantities as raw

materials. Mining, therefore, exhibits a developed phase of the growing human culture and ingenuity.

Mining, though mainly depends on the geological factors; but the development and exploitation of the mineral resources depend largely upon human factors. The human material may not be responsive to environment; transport may be absent or primitive; instability and weakness of Government may check the flow of capital to mining enterprises. China and Balkan peninsula afford striking illustrations of the retardation brought about by the operation of human factors.

Modern industrial civilization is based to a large extent upon the mineral fuels and ores. Therefore, no full appreciation of the potentialities of regions and or countries for human use, or of their industrial development and economic problems, is possible apart from their relation to these fundamental earth resources.

Unlike agricultural crops, mineral products are fixed in quantity, and cannot be increased or replaced. Once the minerals are extracted from the earth, they are gone for ever. Mining is therefore, a kind of robbery, because it takes away something which it cannot give back. It robs nature of her products. Minerals are decreasing rapidly and in future, civilization may be threatened by their shortage.

Minerals may be broadly divided into two categories—(a) metallic and (b) non-metallic. Among the metallic minerals are iron, copper, lead, tin, zinc, gold and silver. These are not, however, found in a pure state, but are usually mixed up with other elements or substances; that is what is meant by saying that the metals occur in 'ores'. Non-metallic minerals are represented by coal, petroleum, salt, sulphur, clay, building stones, etc. They are more numerous than are the metals.

METALLIC MINERALS

Iron. Iron, though not a precious metal, is the most valuable and useful of all the metallic minerals, and has perhaps the widest distribution. The place it holds in the life of modern man needs no elucidation. It has been said that there are few ores which do not contain a certain percentage of iron. But iron ores obtained from the mines are the only useful source.

There are many types of iron ore, but only a few—hematite, magnetite, limonite and siderite are of importance. Generally iron ore containing less than 50% of metallic iron is not profitable to mine.

Iron ore is largely mined in the U.S.A. and produces about

one-third of the world output. The ores occur mainly in the provinces of Minnesota and Michigan in which Mesabi and Vermilion, Gogebbic and Marquette ranges are important.

In Europe the Lorraine field in France Siegerland and Silesia in Germany, Cleveland, Lincolnshire, Oxfordshire in England, Knivov Rog in U.S.S.R. and Luxemburg, Belgium, Spain and Sweden are important for iron ore mining.

Outside North America and Europe rich reserves occur in many other countries but few have developed the mines due to lack of demand. In China, India, Algeria, Brazil and Chile iron ore is fairly distributed.

Copper. Unlike iron, copper is often found native in nature, but the bulk of the world's production is mined from ores. It has a very wide distribution, and it entered into human civilization long before iron. Although it has long been replaced by various other metals for many of its former uses, its demand far from being reduced, is increasing. This is mainly due to the rapid increase in the use of electricity and the development of automobile industry. As it is the best conductor of electricity, it has become a 'key metal'.

The U.S.A. is the biggest producer of copper, i.e., 60% of the world's production is contributed by it. Next in order comes Chile, Central Africa, Canada and Japan. Other than these Russia, Peru and Iberian Peninsula are important producers.

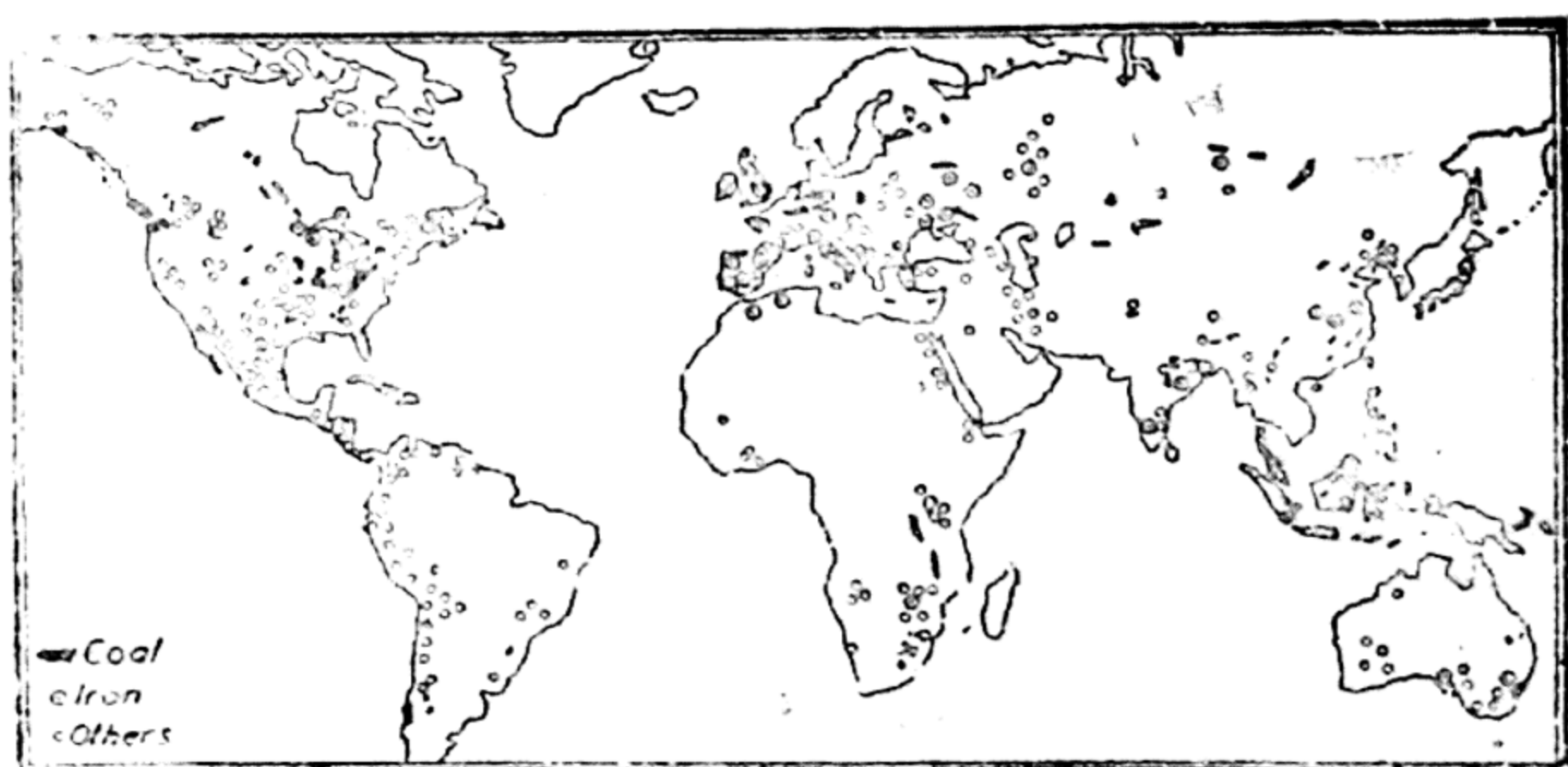


Fig. 24—The World Mining Regions

Lead. Lead ore generally occurs mixed with other metals. Very frequently it is found with silver and zinc. The U.S.A. is the largest producer of the ore as well of the metal. Approxi-

imately about a quarter of the world's lead is produced in U.S.A. Australian mines are also important producers. The other mining centres are Mexico, Canada, Germany, Spain and Burma.

The demand for lead, like that for other non-ferrous metals is the largest in the industrial countries of Europe and America. The U.K. is the largest importer but being deficient in lead most of the other countries of western and central Europe also import considerable quantities of the metal.

Tin. Tin is frequently found in pure state and like copper was put to use much earlier than the other industrial metals.

The largest deposits of tin are found in South-eastern Asia, the Malaya States, Netherlands, East Indies and the neighbouring areas of Burma, Siam and China together produce nearly two-third of the world's tin. Outside this area the next biggest producer is Bolivia, contributing a quarter of the world's total production. The next great producer is Nigeria. Here the mention may be made of Australia and Cornwall in Britain as small producers. The U.S.A., so rich in various other minerals, is devoid of tin, and has got to import large quantities from other countries especially Bolivia.

Zinc. Zinc ores are often found in countries where lead is abundant. The leading producers are the U.S.A., Belgium, Poland, Canada, Germany and France and with them may also be named Australia and Great Britain, Norway, Holland and Italy are lesser producers.

Aluminium. Like iron it is quite abundant in nature, and is very widely distributed. But the task of separating it from the ore is generally very difficult and costly. Bauxite is a kind of aluminium ore which, however, is comparatively easy of exploitation and contains the highest percentage of the metal. France has the largest known reserves of bauxite in the world, other important deposits are found in the Guineas and the U.S.A. Lesser deposits of bauxite are found chiefly in Yugoslavia, Italy and Hungary.

Gold. Gold is a precious and a valuable metal not because its economic utility is greater than other metals but because it is rarely found and therefore much costlier. It may well be called 'the king of metals'. On the average, about 25 million ozs. of gold are mined every year. As gold is the standard of world's currency, its production has been maintained at a remarkably constant level. The Union of South Africa is an outstanding producer contributing more than 30% of the world's total. The other important producers are the U.S.A., Canada, Soviet Russia and Australia. India produces about 1% of the world's gold. Other important producers are New Zealand,

Mexico, South America, Southern Rhodesia and Gold Coast in Africa.

Silver. The bulk of the world's silver, unlike that of gold is not found 'nature in nature'. Native silver is rare. It is generally found associated with lead. Besides, much silver is obtained from gold and copper ores, silver rarely, if at all, occurs on alluvial deposits. Mexico is the largest producer of silver in the world, her contribution being a little above one-third of the world's total. The U.S.A. comes second and Canada holds the third place. Peru and Bolivia in South America are also important, and in Asia the two most noteworthy producers are Burma and Japan. Australia is also not an insignificant producer.

NON-METALLIC MINERALS

Many non-metallic minerals like sand, clay and salt are so commonplace in occurrence that their utility and importance is frequently overlooked.

Those that are more rare like sulphur, phosphorus, etc. form the basis of many important industries. The distribution of non-metallic minerals is much more extensive than that of the other groups, and therefore the problem of conservation is not as urgent in their case.

Common clay is available practically in every region of the world. Since the primitive times it has been used in various ways but pure qualities of clay are nowadays used for making into excellent pottery in such well-known localities as Limoges in France, Stoke-on-Trent in Central England and at Trenton in New Jersey. China porcelain is made from Kaolin (China clay). Japan and Germany are well known for the manufacturing of the best variety of porcelain.

Mica, chalk, graphite, sand and fuller's earth are other non-metallic minerals that are used in very large quantities in different manufacturing industries. Building stones of which the more important are limestone, sandstone, granite and marble are widely distributed and are almost universally used as building materials.

SOURCES OF POWER

Human geography studies human efforts towards perfection, more yields, saving of energy and more comfort for him. If we study the growth of civilization, we will find that it is very closely connected with the progress of 'power' at the service of man. All the machines invented by man do not mean anything without 'power' to work them. In old days man and ani-

mals were the main sources of power. Running water was first to be noticed by man which could be utilized as a power to move the wheel. To this were added wind, wood, coal, natural gas, petrol and alcohol. The latest to be added in this list are solar energy and atom.

Wheel itself was the greatest invention of man. After this invention man remained busy in finding ways and means to run it without human effort. The invention of turbine and internal combustion engine further revolutionized the use of power because the energy could now be stored and transmitted. The importance of power further enhanced by its increasing use in transport. In our age of speed, the slow moving machines look outdated and there is search for speedier machines.

The sources of power can be divided into the following four major groups:—

1. Man and animals.
2. Nature (wind and water).
3. Vegetation and Minerals (wood, coal, oil, natural gas and alcohol).
4. Others (solar energy, atom, tide, etc.).

There can be another method of classification of these sources of power. Some are exhausted like coal and petroleum whereas others are inexhaustible like water and solar energy.

Man in the beginning depended entirely on his own energy for all types of work. The occupations were simple like lumbering, gathering and hunting. For hunting he invented tools using wood, stones or hides. The simplest machines invented were *chakkies* for grinding flour, handlooms for weaving and 'kohlus' for crushing oil or sugarcane. Their working was simple and man could produce sufficient meeting his own needs and that of his locality with a small population. Animals were used for running these small machines as well as for pulling country made carts which have remained the only means of transport for centuries together though the form of carts have been changing according to the topography of the region and the type of work. The most important work of man was ploughing which has been done either by man himself in some regions but mostly by animals as the main sources of draught. Even to-day, at such an advanced stage of civilization, animal still remains a very important source of power for all type of work in villages—for irrigation, transport, ploughing, winowing, oil crushing, grinding, etc.

Wind power is the gift of nature to man. Its use reflects

the advancement in technical knowledge of man as its use requires handling of a bit more complicated machinery. Man must have used wind for water transport before using it on the land surface. For a very long time wind has played a very important role in the ocean transport of the world. The wind mills were first developed in the temperate region or the zone of Westerlies. Holland and Denmark were pioneers in this field. In the states of Wisconsin and Iowa in U.S.A. various small units of windmills have been installed on various farms using them for small irrigation works, for cutting fodder and wood, etc. These windmills are being converted into small electric generating units in Denmark, Germany and Holland.

Water Power. As already pointed out, water power was first to be developed by man. Water wheel is being used in some hilly regions from times immemorial for running small 'chakkis' or wheat grinding mills. In 18th century the invention of steam engine brought about a big revolution. In Denmark, Norway and Sweden small units for generating hydro-electricity were installed. The invention of hydraulic turbine and dynamo was responsible for its use. In the last half a century, the taming of various streams in order to use their waters for generating hydro-electricity has engaged the attention of man. Hydro-electricity is termed 'white coal' as it can easily substitute coal for power generation. It is inexhaustible source of energy as nothing is lost in this process.

Hydro-electricity cannot be generated anywhere and everywhere. Certain physical factors are essential for its development, viz.:—

- (i) Rugged topography providing waterfalls and increasing water velocity;
- (ii) The volume of water in the stream should be more or less uniform as floods are likely to damage the power plant whereas low water may cause stoppage due to insufficiency of flow. In the case of India the rainfall is uncertain and irregular and therefore at every generating station, a storage tank has to be erected to regularize the flow and supply of water;
- (iii) The site of power station should be easily accessible for transporting the plant and machinery, etc.;
- (iv) Distance from the consuming centres should not be great. Transmission involves a loss of current over long distance. It increases maintenance charges also.
- (v) Where water can be utilized for irrigation, there is extra income and thus the total charges on capital give better yield.

In the case of India, the construction of dams across various rivers have helped to check the intensity of floods. The snowfed rivers are more suitable for this purpose.

The potential hydro-electricity of any country depends upon the water resources of the region and the topographic factors mentioned above. According to 1948 estimates the potential water power of the world has been estimated at 664 million H.P. of which only 13% was developed in that year. The potential water power of various continents is given below:—

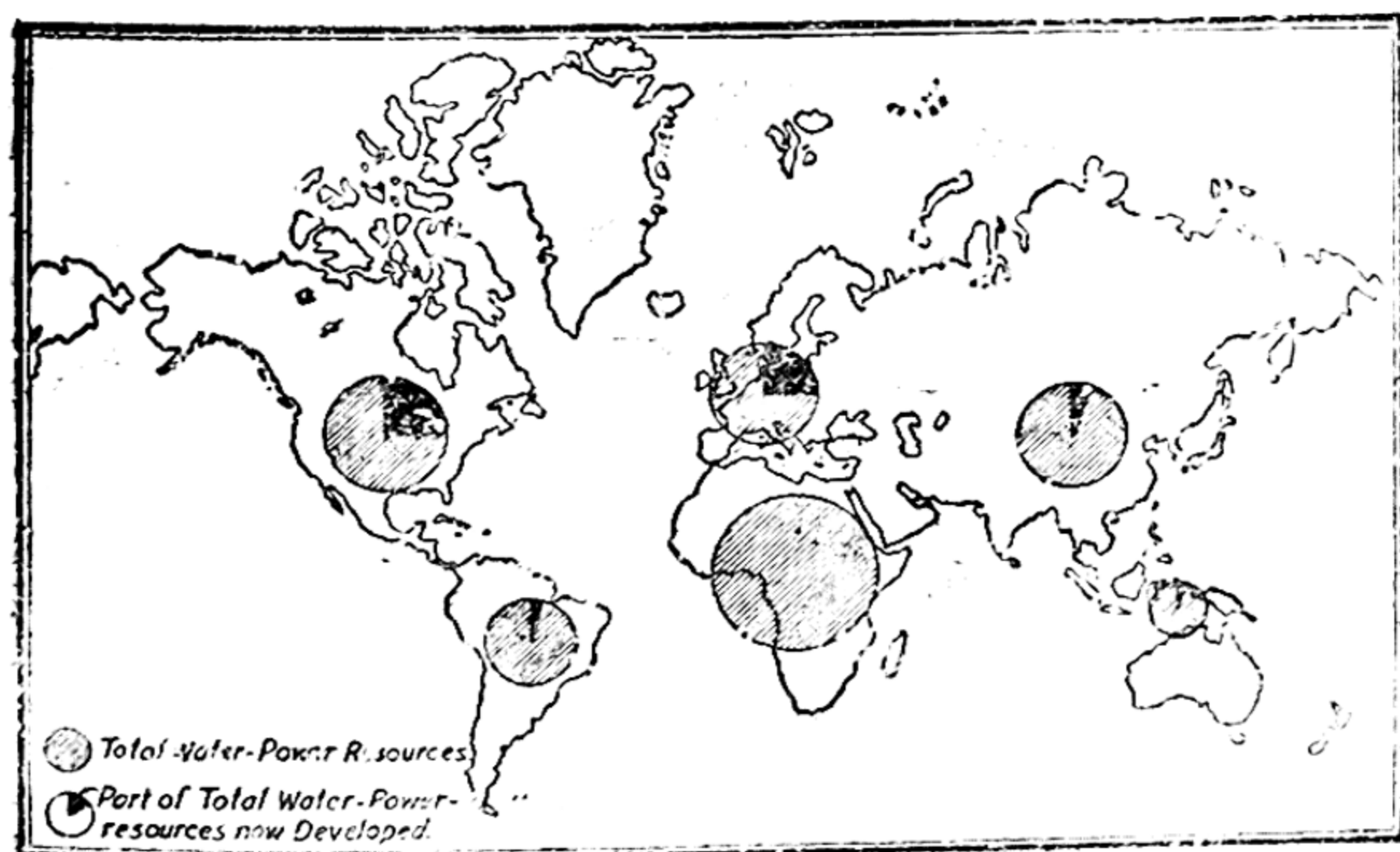


Fig. 25—Potential and Developed Hydro-electricity

Continent	Potential (in million h.p.)	Developed	Percentage of developed
N. America	84	35	42%
S. America	66	2	3.5%
Europe	67	34	51%
Africa	273	.3	0.1%
Asia	150	12	8%
Oceania	20	1	6%
Total	664	86	13%

From the above figures, it may be noted that of the total hydro-electric potential nearly 41% is in Africa alone. The centre of this continent is occupied by a mass of high plateau and almost all the rivers form rapids and falls. Asia comes

next in the potential resources but even here the development has taken place in Europe and North America.

In Europe the largest potential is in Norway and Soviet Russia whereas remarkable development of this 'white coal' has been achieved in Italy, France, Sweden, Switzerland and Great Britain as is clear from the following table:—

<i>Country</i>	<i>Potential</i> (in million h.p.)	<i>Developed</i>	<i>Percentage</i> <i>developed</i>
Italy	6	6.2	104%
France	6	6.1	101%
Sweden	4	3.8	95%
Norway	10	3.8	38%
Switzerland	3.6	3.7	102%
Germany	2	3.6	130%
Soviet Sussia	14	1.1	13%
Great Britain	.7	.48	61%

From the above figures it may be noticed that in Italy, France, Switzerland and Germany, the same water has been utilized more than once and hence their developed electricity is more than their potential.

In Asia, some countries have developed hydro-electricity to a considerable extent whereas in others no development has taken place at all. Japan and Korea have made remarkable progress in this direction whereas India is moving ahead with her plans completing various multi purpose projects. The following table gives the potential and developed hydro-electricity in some countries of Asia:—

<i>Country</i>	<i>Potential</i> (in million k.w.)	<i>Developed</i>	<i>Percentage</i> <i>deveioeped</i>
Japan	7.2	8.6	120%
Korea	3	108	60%
China	22	.004	0.01%
Siberia	64	.03	.5%
India	35	1.2 (1956)	3%

Coal. It is a mineral substance of a dark brown or black colour, composed of the remains of plants and containing such proportions of carbon and hydrogen that it can be used as a fuel. Since the invention of steam engine by James Watt this fuel or coal has superseded all other sources of power. At the

present day all forms of production are primarily dependent on coal. Today coal is the most important source of motive power.

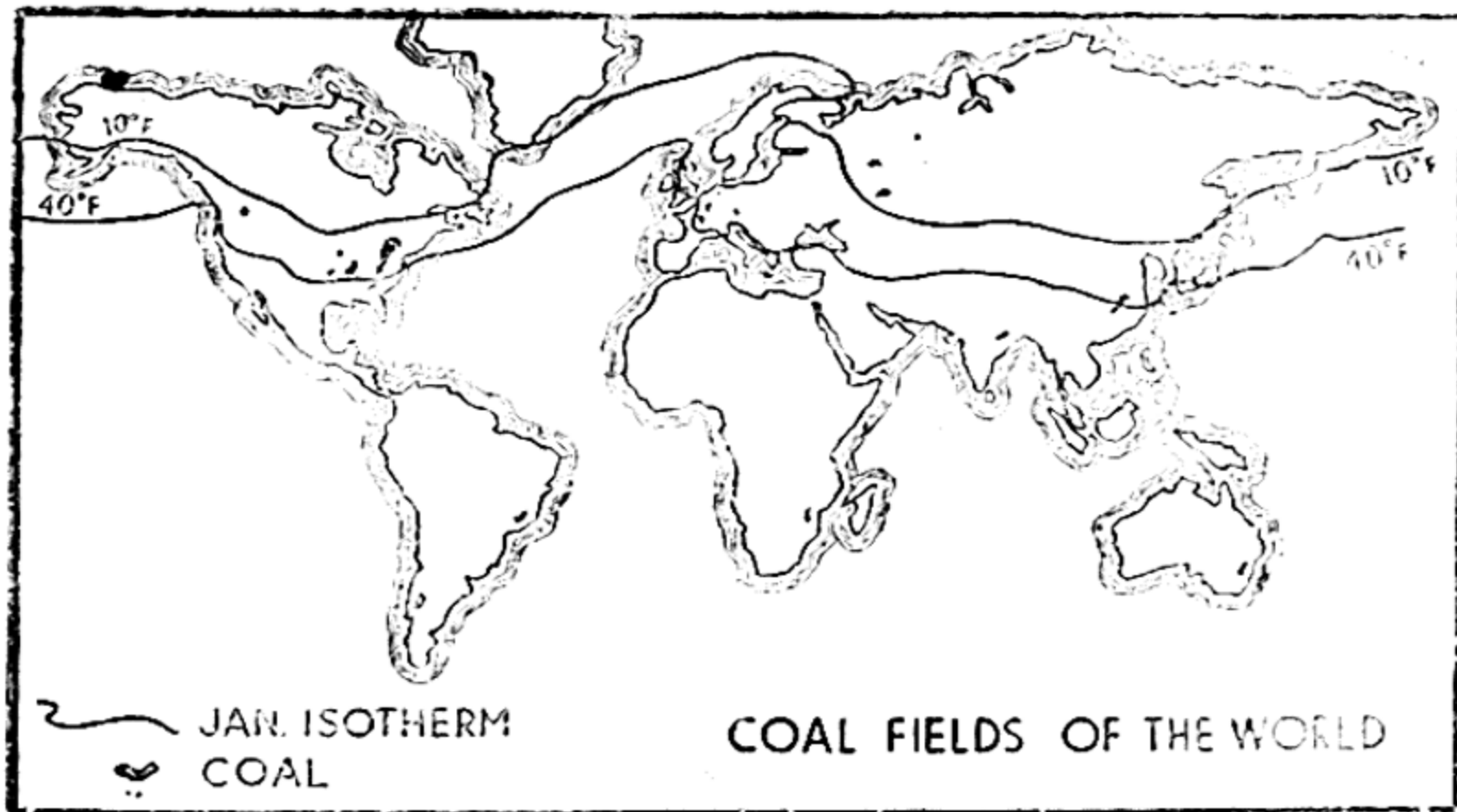


Fig. 26—Coalfields of the World

In general the quality of coal depends on its hardness and carbon percentage. The common classes of coal in order of merit are anthracite, bituminous and lignite or brown coal. amongst these bituminous is largely used in most of the countries.

Various agencies have estimated the total coal reserves of various continents but not many are reliable. Bituminous reserves are supposed to be largest—53% of the total followed by 40% lignite and only 7% other varieties.

In 1950 the total output of coal in the world was 1722 million tons. The production of coal in some important countries is as given below:—

Country	Output (million tons)
U. S. A.	496
U. S. S. R.	252
U. K.	216
Germany	175
Poland	81
France	51
Czechoslovakia	45
Japan	39
India	32

Though coal is a fairly abundant mineral every country of the world is not equally endowed with it. The continent of North America is supposed to contain about 70% of the total world reserves. The important coalfields are situated in the eastern provinces extending from Pennsylvania along the flanks of the Appalachian Chain to the state of Alabama in U.S.A. The Appalachian coalfields produce roughly about 70% of the total raised from the U. S. A. The other coalfields of the U. S. A.

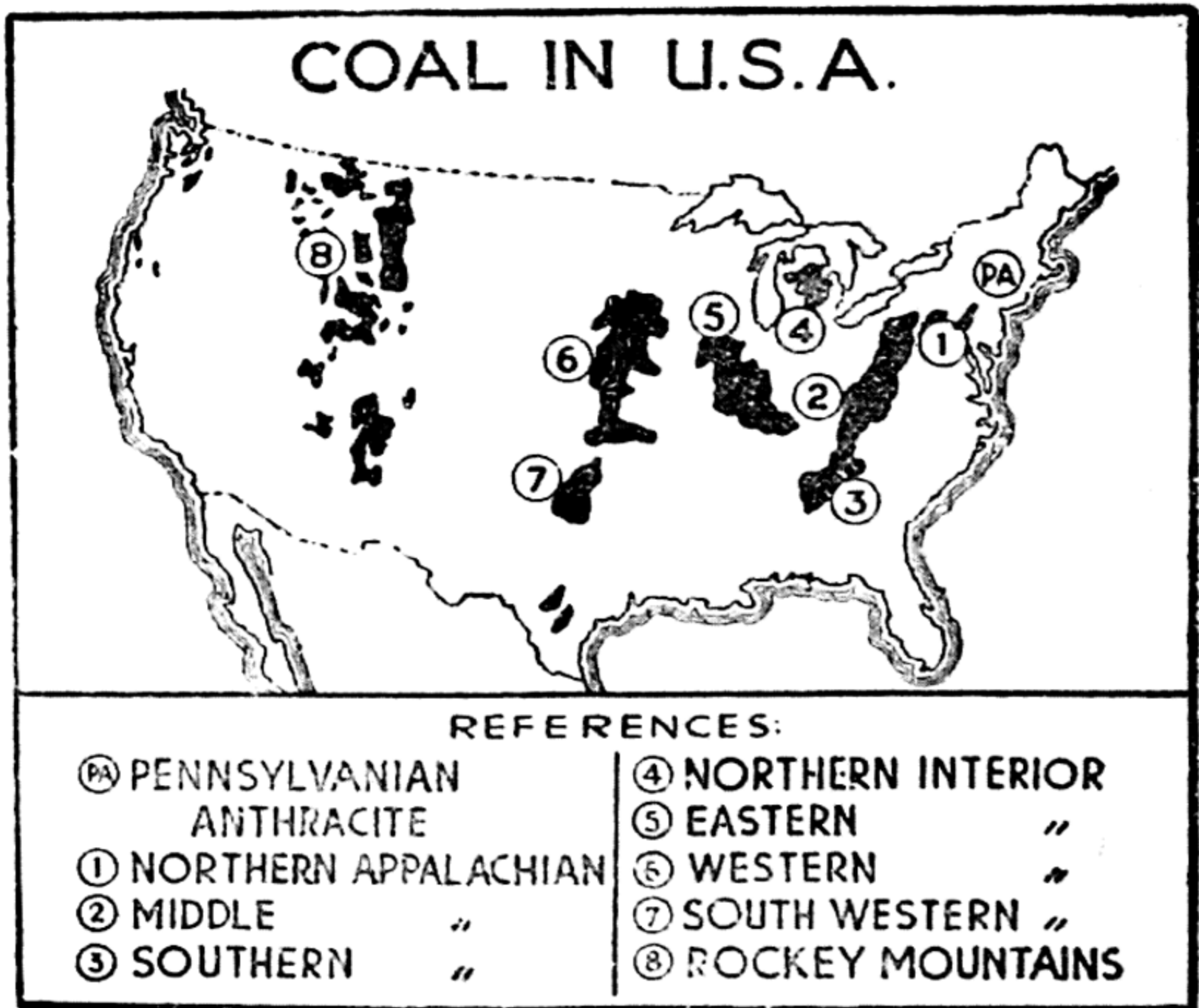


Fig. 27—Coal in U. S. A.

are situated in the interior and are known as the Eastern Interior and Western Interior fields. Coal is also produced from the gulf coast fields. In the Western part of U.S.A. coal reserves are scattered all over the rocky region but the coal is generally of a poor quality and therefore, less exploited.

Next to the U.S.A. Canada has got the largest reserve but the produce is low, owing to the odd situation of the coal fields.

The United Kingdom is the second largest coal producing country of the world. The main coal fields are Scottish fields in Fife-shire, Northumberland and Durban in Great Britain, Yorkshire fields, South and North Straffordshire fields, Lancashire and South Wales.

Germany is the third largest coal producing country of the world. Most of the coal is lignite and bituminous variety and is lying in the Ruhr basins at West-phalia, in Saxony and in upper-Silesia.

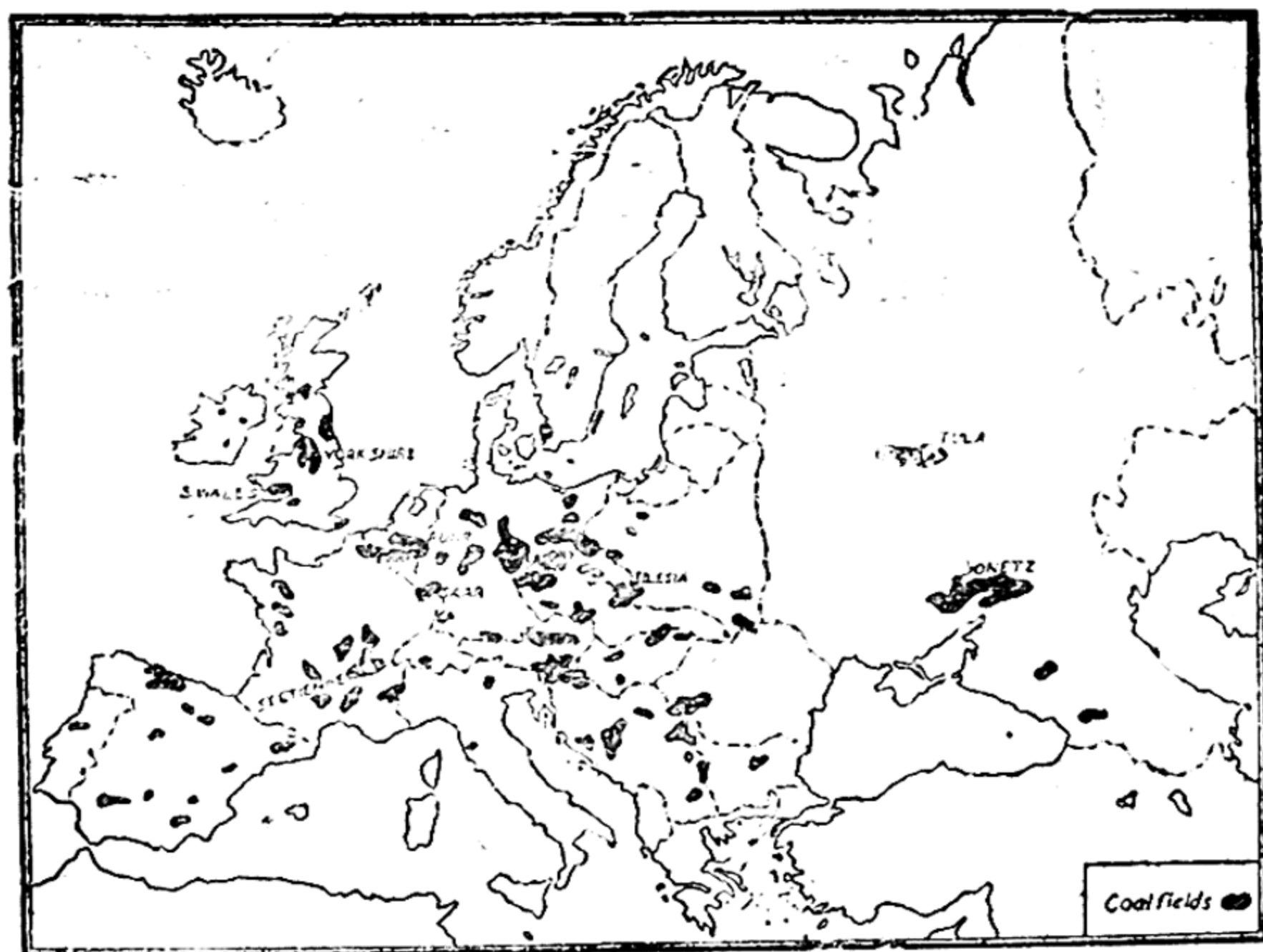


Fig. 28—Coal Distribution in Europe

Most of the enormous reserves of the Soviet Russia occur in its Asiatic territories, but they are rarely exploited. The most significant fields are Donetz and Tula Coalfields and the Ural fields lying in Europe.

Other than these France, Belgium, Poland and Czechoslovakia are fairly important coal producing countries in Europe.

In Asia, China is estimated to have the largest reserves, but her production is low. Japan is the leading producer of coal in Asia. Though coal deposits in India are fairly extensive but the production is not correspondingly high. Most of the coal occurs in the Gondwana belt. Raniganj in Bengal, Jharia, Bokaro, Giridih and Karanpura in Berar and Orissa, Singrauli, Umaria, Mohpani and Penchvalley in Madhya Pradesh and Singareni in Andhra.

Petroleum. Petroleum, literally meaning rock oil is believed to have been deposited underground being exuded from the remains of marine animals. Its existence has been known

since antiquity from surface seepages but until half a century ago little was known of its distribution or modern usages. To-day coal as a fuel is incapable of satisfying all our needs, and as a source of power petroleum is becoming important.

The U.S.A. is by far the largest petroleum producing country contributing more than 60% of the world's output. She is the largest consumer of petroleum and its products. The prolific oil producing areas of the U.S.A. are in the States of Texas, Kansas, Oklahoma Arkansas and California.

The U.S.S.R. is the next important petroleum producing country to U.S.A., Baku and Batum on the Caspian Sea have for a very long time been the steady producer and north of the Caucasus Grozny and Maipop are the other oil producing fields of the U.S.S.R. In recent years the Ural region is also producing petroleum in increasing quantities.

Venezuela, Iran, Rumania, the Dutch East Indies, Colombia, Iraq, Argentina, Peru, Trinidad, Poland and Burma are other significant producers of mineral oil.

The position of India with regard to her supplies of petroleum is really critical. The total output is less than 0.1% of the world's average; and this insignificant supply is insufficient to meet even a fraction of the demand.

CHAPTER 8

SECONDARY OCCUPATIONS OF MAN

MANUFACTURING

Manufacturing consists in the process to change the form of materials in order to make products with desired qualities, such as less weight, greater permanence, or increased usefulness. Iron ore as it comes from the mine is practically useless, but after smelting, transformation into steel and shaping into implements and machines, it acquires great value. It is so with a majority of the products of farm, forest, and mine. Only a few, such as certain vegetables, fruits, coals, etc., are ready for human use in their primary state. Among primitive peoples, most required articles were originally made in their entirety by individuals and there was little division of labour. But the invention of labour saving machinery and the use of steam power led to the industrial revolution, the division of labour, and the development of factory system and capitalism. To-day civilized man specializes, and large manufacturing establishments have been built to turn out quantities of a single product. Modern life, especially in the cities, is directly dependent upon manufacturing and the transportation and exchange of commodities. Our food, fuel, shelter, clothing and conveniences of life depend upon industrial plants.

WORLD DISTRIBUTION OF MANUFACTURING

It is quite well known that most of the densely populated areas of the world are the result of the concentration of manufacturing activities, and for many years it has been apparent that increases of manufacturing has been accompanied by the growth of cities. The principal causes that contributed to the geographical location of manufacturing districts, such as power and fuel, raw materials, capital, labour and marketing facility, etc., are known to us; and obviously these causes must be exceptionally favourable where our most important industrialized regions are found.

1. MANUFACTURAL REGIONS OF NORTH AMERICA

The most important manufacturing regions in North America extend westwards in a broad belt from the Atlantic coast between southern Maine and Chesapeake Bay as far as St. Louis and the twin cities of Minneapolis and St. Paul. It includes southern Michigan, peninsular Ontario and the St. Lawrence valley as far down the river as Montreal, but it excludes some rural regions. Within this American manufactures belt there is considerable degree of specialization in manufactures. This belt contains a number of distinctive industrial areas which are:—

(i) *New England Districts.* These areas are chiefly favoured by abundant water power and raw materials obtainable from her forests. It is due to this fact that American factory industries were established in New England at an early date. It is a deficient area of iron ore, coal and petroleum. Coal is therefore brought from the Appalachian fields, and the import of petroleum products and raw materials for manufacture (cotton, wool, hides and the like) is favoured by its sea board location. Traditionally it is important for its textile mills and metal fabricating establishments. Textile manufactures are concentrated in the Merrimac Valley of Massachusetts near the cities of Lowell and Lawrence and in New Hampshire at Manchester, Concord and Nashua. Another section famous for its textiles is the Backstone valley, Narragansett Bay at New Bedford and Fall river. The fabrication of metal products such as hardware, tools, electrical equipment, firearms and machines is a manufacturing speciality of the Connecticut valley. The manufacturing of shoes and other leather goods is important in eastern Massachusetts at Haverhill, and Brockton, optical goods, watches, clocks and hundreds of small items are products of New England's mills and factories.

(ii) *The Middle Atlantic.* In this region manufacturing centres are divided in two main groups; those located near or on the coast, and those occupying inland sites. The coastal region includes New York city, Baltimore and Philadelphia with their affiliated satellite and metropolitan areas. These port cities process many imported raw materials for local use and for shipment both inland and abroad. New York city is a great manufacturing centre where cotton and woollen textiles are produced. The city also serves as a centre for many of the publishing houses of national scope. Washington has little manufacturing activity compared with other cities of equal population although its printing and publishing business is well developed.

With its seaboard location, it has the advantage to secure coal from the Appalachian fields by rail, and petroleum by pipe line and ocean tanker. Much iron and steel is manufactured in eastern Pennsylvania and near Baltimore. Textile, leather, locomotives, electrical equipment, blast furnaces, steel mills and ships, chemicals and small metal goods are made near Philadelphia. Baltimore is famous for its airplane plants; Wilmington, Delaware, is an important centre for the manufacture of explosives. The cities of eastern New Jersey carry on the refining of oil and the processing of metals and food stuffs. Leather goods is an important industry in south-eastern Pennsylvania and in southern New York with towns in vicinity of Binghamton, making quantities of shoes. The seaboard manufactures a great variety of other products too numerous to itemize.

(iii) *Central New York Industrial Belt.* A well industrialised zone extends across upper New York State from Albany to Rochester along the line of the New York Barge Canal. It has several main rail road lines that traverse this low corridor connecting it with Hudson river and Lake Erie. Textiles, clothing, chemicals, photographic supplies, metalwares, electrical and other types of machinery, paper and scientific instruments optical instruments, chemical products are among the goods produced in this part of the manufacturing belt.

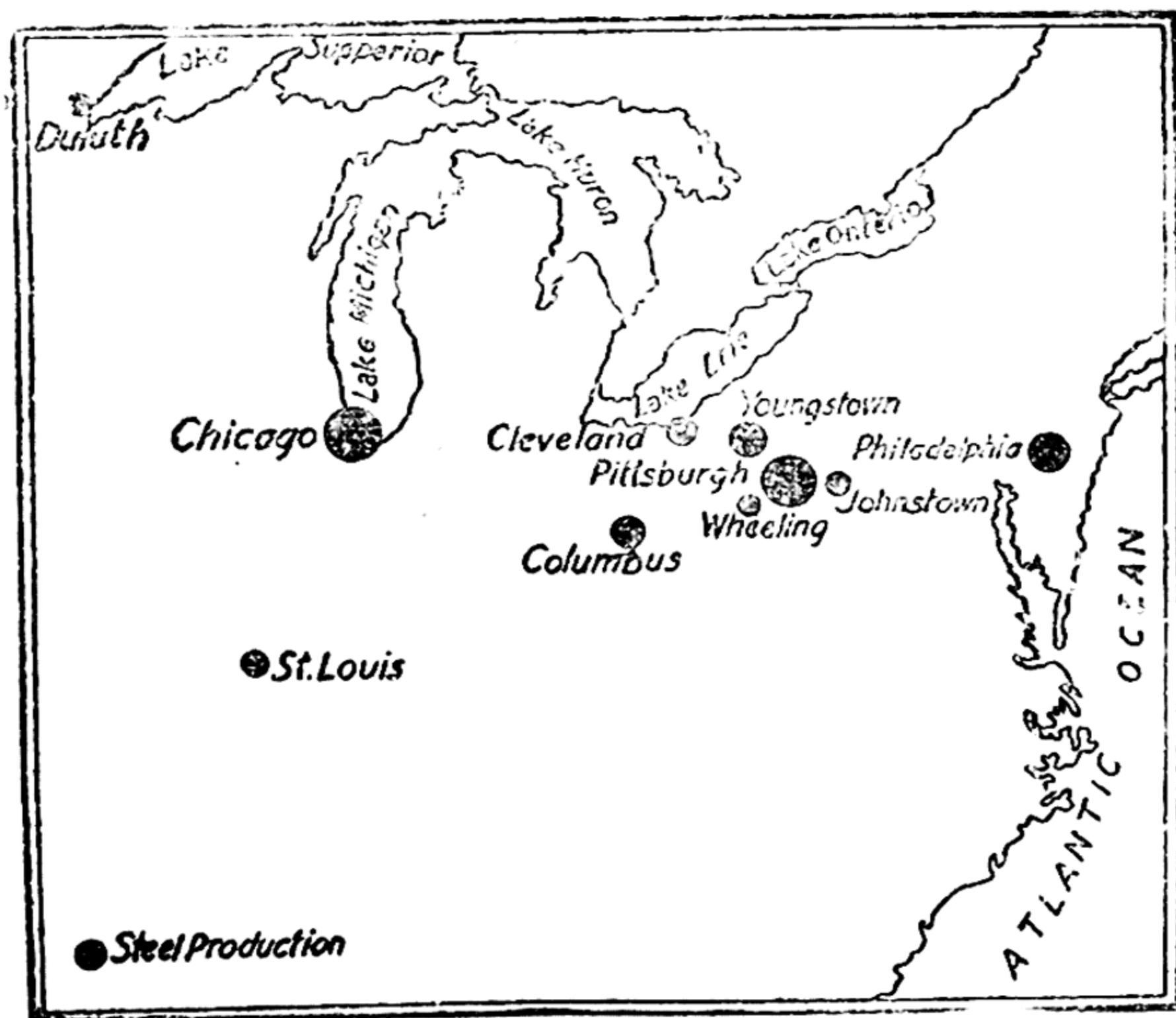


Fig. 29—Distribution of Steel Industry in U.S.A.

(iv) *Pittsburg Region.* In Western Pennsylvania and in West Virginia, the cities and the mills located in the stream valley bottoms; they obtain such raw materials as coal, oil, limestone, and other needs from the adjoining hills of the plateau. The making of iron and steel, and its use for the manufacture of all types of machinery, pipe, structural steel, and other products is the leading industry. Chemical, cement, clay products, petroleum refining, and glass making occupy many people. Pittsburg is the leading city, although there are many other centres of heavy industries, including Charleston, Wheeling and Huntington, West Virginia, scores of industrial towns and cities

lie within the Pittsburgh district, with Youngstown, Massillon and Canton, Ohio, on its periphery, where the influence of Cleveland's activities is felt to a degree.

(v) *Southern Great Lakes Region.* This district is one of the most important manufacturing districts in the country. The coal is brought here by rail from the interior; iron ore, lumber, and grain is brought in by ship down the lakes. The zone continues along both shores of Lake Ontario and for some distance down the St. Lawrence; it includes some inland areas that are tributary to the lakes. Some of its industrial centres like Gary, Cleveland, and Buffalo specialize in the production of iron and steel goods. These cities, with others like Chicago, Milwaukee, Racine, Detroit, Toledo and Toronto manufacture machinery and a wide variety of iron goods. Detroit and others lead in the manufacture of motor vehicles, an industry that is likewise important in Cleveland, Southbend and many other places. The places like Akron, Ohio, specialise in the manufacture of rubber articles, shipbuilding, tractors, railroad, cars, paint, furniture, paper, clothing, chemicals, agricultural implements, clay products and publishing are important within this part of the industrial zone and many of these goods are specialities of Chicago factories. The manufacture of flour, and the processing of meat, fruits, and vegetables, corn and soyabean products, and many other types of economic activity within this region depend upon the abundance of farm products, some of which come from local regions and some of which are shipped in from western states.

(vi) *Ohio and Upper Mississippi Valley.* It includes the river town and centres like Indianapolis Columbus and Dayton. The important cities like Cincinnati, Wyansville, and Louisville on the river Ohio and St. Louis Rock Island, Moline, Davenport and twin cities of Minneapolis and St. Paul on the Mississippi have advantage of the proximity of fuel except the twin cities. Many materials are available here for manufacture, including farm products, timber, iron, lead and zinc and clay and stone. This region is highly populated area of this country and is well supplied with rail transportation. Metal working, chemicals, shoes, meat packing, clothing, furniture, automobile parts and the turning of many types of machines are among the important industries of this region. The processing of foodstuffs is particularly important.

The westernmost part of this zone extends to Kansas city and Omaha, Nebraska and Wichita, where meat packing, flour milling, oil refining, and car shops are the important activities. Wichita is an airplanes manufacture centre.

(vii) *Southern Highland Borders.* In the present cen-

tury the south has made great advances in its manufacturing. The Piedmont area which extends from Virginia through the Carolinas into Georgia is a leading centre for the manufacture of cotton and rayon textiles. Greenville and South Carolina claim to make more cotton cloth than any other city in the U. S. A. Cheap and plentiful hydel power and relatively cheap labour are two principal advantages of the Piedmont district. Cigarette manufacture is a speciality of Durban and Winstome-Salem, North Carolina. Farther south, Birmingham, Alabama, with its coal and iron ore supplies near each other, manufacture much iron and steel. On the T. V. A. project, electric power installed has been a factor in smelting aluminium and in the development of various chemicals industries. The other coastal cities of the south like Savannah, Georgia, Jacksonville and Florida, depend on the forests for their output of lumber, paper and ship stores.

New Orleans and Baton Rouge in Louisiana, Houston, Texas and the cities along the coast of that state are important in the refining of petroleum and in the manufacture of chemicals, they are also increasing their processing of food production and their general manufactures. Inland, Fort Worth, Dallas and Oklahoma city are among the growing cities of this area.

(viii) *West Coast Districts.* This area is of growing industrial importance, though it lacks some of the essentials that have contributed to the success of industry in other parts of the country. Aircraft manufacture is especially important at San Diego, Los Angeles and its surrounding communities. In the Los Angeles and San Francisco areas, petroleum refining, ship building, clothing manufacture, home furnishing, publishing and food processing are important activities. Hollywood is world famous for its motion pictures. The northwest cities of Portland, Oregon, Seattle, Vancouver and British Columbia are traditionally important in the lumber, paper and fishing industries of that section; but they have begun to expand along many lines of general manufacture, cheap hydel power is encouraging the growth of the aluminium industry, steel making, and the manufacture of chemicals.

2. MANUFACTURAL REGIONS OF EUROPE

Europe is the most highly industrialized continent as the result of a combination of circumstances that include its early start, its skilled labour, its available power and raw materials and especially its coal and iron and the inventive genius. Again the continent is accessible for trade, enjoys types of climate favourable for industrial activity, and has a large local market in its population. Inventions and factory methods used during the industrial revolution were first applied in European industry.

The heavy industries of Europe depend on coal and iron, and the location of these essentials accounts for the concentration of coal mines, blast furnaces, steel mills and machinery manufacture in Great Britain, the Ruhr Valley of Western Germany, northern France, Belgium, Southwestern Poland, Czechoslovakia and Saxony, the Donetz Basin, Moscow and the southern Ural regions of U.S.S.R. Chemical industries often accompany heavy industries. Many of the light industries such as clothing manufacture, publishing, food processing and drug manufacture are located in the cities.

(i) *British Centre.* Among the important centres of indus-



Fig. 30—Distribution of Steel Industry in Great Britain

try, the Midlands region near Birmingham and Sheffield in the north is most important for machinery, vehicles, hardware, munitions, chemicals, glass and numerous small articles. London though it works on its imported coal but is a great manufacturing centre; nevertheless, its industries include clothing, publishing, soap, food processing and chemicals. North-east England at New Castle and other towns manufacture iron and steel into machinery, ships and cars and make chemicals from its salt and coal. Western England leads in the weaving of cotton textiles at cities like Manchester, Preston, Bolton, Blackburn Oldham and Lancashire. In these centres, coal for fuel was readily available and spinning and weaving received an early start, as well as the manufacture of machinery needs for this type of undertaking. The port of Liverpool on the west coast maintains much ocean traffic with America, from whence come raw cotton, grain and meat all needed in this industrial area. Woollen goods are a speciality manufacture of Yorkshire district which detains its supply of raw materials from the nearby Pennine Hills. Leeds, Bradford and Halifax also manufacture woollen goods. The principal manufacturing area in Scotland is the city of Glasgow, famed for its ship building, machinery and textiles of cotton, wool, linen and jute. Belfast in northern Ireland also is a ship building centre and a source of linen manufacture.

(ii) *French Region.* The principal manufacturing industries of France are located in the northern and north-eastern part of the country, where coal and iron are at hand. This region extends into Belgium and the Saar Basin on the north and east and connects with the Ruhr Valley in Germany. In France, the cities of Valenciennes, Lille, and Nancy are large centres of textile manufacture, the Belgium cities devoted to this industry include Namur, Leige, Brussels, and the Port of Antwerp. These centres are also engaged in heavy and light industry, including iron manufactures, chemicals and food processing. Paris is world famous for designing and manufacturing clothing, millinery and other luxury goods. Lyons in the Rhone Valley makes silk fabrics, automotive equipment and fine soaps.

(iii) *Western Germany.* In Germany the Ruhr Valley is the leading industrial area, largely because of its rich coal deposits. Essen, Dortmund, and Bochum lead in heavy industry and formerly led in munitions manufacture. In Duisburg, Cologne and a dozen other large cities of the area, light metal-wares were made, including hardware and firearms; other activities were directed toward the weaving of textiles and the manufacture of chemicals, cement and many other products and items. Berlin, Munich and Hamburg were important for their general industries. In Saxony, textiles were extensively manu-

factured. Leipzig was famous as a publishing centre and Dresden for its porcelain. In Silesia, which is now incorporated within Poland, there are deposits of coal, iron and zinc and Breslau was the largest manufacturing centre.

Czechoslovakia is fortunate in having a variety of resources, including coal and this nation is important for its manufactures of both heavy and light metal goods. Vienna in Austria and Budapest in Hungary are the large cities having some light industries, but they are now handicapped by the loss of some of their former trade territory.

(iv) *Southern Europe.* It has scattered industrial centres, most important of which is in northern Italy with its cities of Milan, Turin, and Genoa. Switzerland tends to manufacture articles small in bulk but large in value and demanding much skill in their assembly, such as watches and clocks. The nation has no coal supplies but enjoys a considerable development of her hydel power. Barcelona in Spain and Marseilles in southern France are important manufacturing cities of western Mediterranean with the former noted for its cotton textiles, with which it supplies Spain's needs.

(v) *The U. S. S. R. Region.* Great efforts have been made here in this country to industrialize it and to recover from the great destruction experienced during the war, in which its cities and industries were seriously damaged. Coal deposits in the Donetz Basin and near Moscow are of great help in supplying fuel for Russian factories. Water power has been developed on the Dnieper river. Before the war, Kharkov, Rostov, and Stalingrad, were important centres of heavy industry. Moscow, like most large cities has numerous manufactures, including textiles, publishing houses, clothing and food processing. The southern Urals, with some coal and much iron ore, in company with other minerals, have important plants for steel and iron and munitions at Magnitogorsk, Sverdlovsk and other centres. Farther east in Siberia, steel and chemical plants are located at Stalinsk and other cities in the Kuznetsk Basin.

3. MANUFACTURAL REGIONS OF EASTERN AND SOUTH-EASTERN ASIA

The relation between coal deposits and the location of manufactural districts so commonly observed in Europe and America appears to be less conspicuous in the Orient. The great coalfields of northern China have no associated manufactures, whereas the high industrial development of Japan has comparatively little coal to support it. For an explanation of these facts one must turn to the industrial history of the two countries.

(i) *Japan.* It has only small and limited coalfields, and even less iron ore, but her minerals are readily accessible for manufacturing. Before the recent war, Japan led Asia in its development of heavy industry. This depended partly on hydro-electric power in which Japan leads Asia and also on her import of coal and iron from Manchuria and Korea, coal from Indo-China and iron ore from the Philippines. Most of Japan's oil was imported. The country also had to buy almost all its supply of raw cotton from abroad, and it needed rubber and many other essential materials in order to maintain a modern manufacturing economy. The industrial base was therefore unsound, although the nation was a large exporter of cotton, rayon, silk, cement, and many small manufactured articles. The future of manufacturing in Japan is not clear, but it probably lies along the lines of light industry rather than heavy goods. The ship building and armament industries are not likely to regain their former importance. The coastal location of most of Japan's industries, and their concentration in relatively few cities made them highly vulnerable during the war. Tokyo, Yokohama, Nagoya, Osaka, Kobe and Kyoto were the leading industrial centres.

(ii) *China.* China has lagged in industrial development, and much destruction of her manufacturing establishments during the war will further retard her. China has large coal deposits and an abundant labour supply. Shanghai was the leading city in industry, with Hankow and Tientsin of some importance. Much of the China's industry is still in the handicraft stage. Plants built by Japan in Manchuria have been partly or wholly destroyed, and, until China's political problems are solved, the beginnings of industry in that area cannot be resumed.

(iii) *India.* Like other lands of ancient civilization, India has a long tradition in the handicrafts. For many years, the factory industries have been established, especially in the textile trades and to an extent also in metal working. The first to develop on a large scale were the cotton mills of the Bombay district of western India. Subsequently jute mills were set up in the Calcutta region, near the source of the raw fibre. The rise of heavy industry in India is, however, of recent origin. The vast deposits of high grade iron ore in the north-west region of Calcutta and the nearby coalfields invited the establishments of blast furnaces and steel mills of modern type, although the coal resources are not great. The large supply of cheap labour makes it possible to produce iron at very low cost. It not only supplies mainly the domestic market for machines and implements but also provides experts. The emergency of war found in the Indian factories a nucleus capable of rapid expansion, and they quickly became an important source of supply in

a variety of goods. Not only textile and leather products were provided for the armed forces, but guns of various types, explosives, vehicles and small machine craft, and a surplus of crude iron and steel was exported for manufacture elsewhere. Now a number of new industries have been developed as a result of State encouragement. India is one of important growing manufacturing regions of the world.

4. MANUFACTURAL REGIONS OF THE SOUTHERN HEMISPHERE

This part of the world has made slow progress in the direction of industrial development, but as yet it is unable to supply its own needs for manufactured goods. Coal is generally scarce, although iron ore and other minerals are abundant in places. Petroleum has been found in South America only, although much exploration for oil fields is under way in parts of Africa. Water power is available for future development in many regions.

Australia has a small population within a large area and has devoted itself principally to farming and ranching, though progress has been made in industry in recent years. Food processing, meat packing, and smelting of ores are under way to a limited extent, and woollen goods are being manufactured. Steel is made at New Castle, New South Wales, and some tools, vehicles, and other manufactures of iron ore fabricated. New Zealand's plants are chiefly concerned with such food as butter, cheese and meat though some woollen textiles are made and saw mills are busy.

In South America, aside from the refining of petroleum and the reduction of minerals, there is manufacture of textiles and many other articles for local consumption. These activities are expanding in many countries, but only Brazil and Argentina have large scale manufacturing establishments. In these nations textiles, clothing, shoes, furniture, and many other necessities are made. Meat packing is very important at Buenos Aires. Agricultural implements and other machines are also made here. Sao Paula, Brazil, has many cotton textile mills, and a modern steel plant has been erected at Volta Redonda, Brazil.

It may be pointed out that the expansion in manufacturing has been the chief force contributing to post-war growth. On the one hand, the high level of demand for manufactures (particularly for investment goods), is a major source of the expanded world demand for primary production; on the other hand, the growth in the productive capacity in all parts of the world and in all sectors of the economy has depended largely upon the accelerated rise in output of heavy industry in the advanced countries of the west.

The main factors responsible for the expansion of heavy industry are many. The higher post-war rates of domestic capital formation and the rising governmental expenditure on defence equipment; the post-war shift in the composition of foreign demand from consumer to capital goods; and lastly the growth in consumer demand for durable goods are the chief basic factors for rapid expansion of these industries in western Europe and U.S.A. So that the metal products industry forms the largest single sector of manufacturing production both in the U.S.A. and Western Europe. The output of metal products was some 58 percent higher in 1955 than in 1948 in U.S.A.

But in contrast with the chemical and engineering industries, output of staple consumer goods industries has been relatively slow in expanding both because private incomes have risen less than national output and also because demand for these products has not risen parallel with the rise in private real incomes. The food, beverage and tobacco industries as a group has shown a somewhat stronger tendency to expand than the textile industry.

The following table gives the indices of output in major sectors of manufacturing in North America and Western Europe (1948=100).

	1948	1955
<i>Canada</i>		
All manufactures	46	123
Food, beverages, and tobacco	51	119
Textiles	49	106
Basic metals	53	140
Metal Products	40	125
Chemicals	44	133
<i>U.S.A.</i>		
All manufactures	45	135
Food, beverages and tobacco	61	108
Textiles	51	103
Basic metals	32	131
Metal Products	31	158
Chemicals	40	153
<i>Western Europe</i>		
All Manufactures	103	178

Food, beverages, and tobacco	103	146
Textiles	111	133
Basic metals	114	195
Metal Products	94	195
Chemicals	96	225

In contrast to these countries, manufacturing in the less developed regions is directed to the production of consumer goods. Output of certain consumer goods has increased considerably but heavy industry, on the other hand, is still of small dimensions and increases in the output have been overshadowed by development in the economically advanced regions. In countries like India, Brazil, Mexico, Chile and Turkey, there has been a relatively more rapid growth of heavy industry than of consumer goods. By contrast, there is a larger group of countries in which post-war growth of manufacturing production has been limited mainly to the development of domestic consumer goods industries and to export industries processing local raw materials like petroleum-refining and non-ferrous ore smelting industries.

CHAPTER 9

MEANS OF TRANSPORT

All forms of communication and transport systems are for the purpose of facilitating the movement of man, his ideas, or his goods from one place to another. As the telephone, telegraph, cable and radio transport man's ideas, so ships, trains, motor cars, air planes, and draft animals transport him and his goods, all to facilitate the economic and cultural progress of man. Modern rapid communication reaches most parts of the earth and supplies the information needed by governments, businessmen, and individuals in order to reach decisions of all kinds—political, economic, military and the like. The ease of communication is a strong unifying factor within a nation, tends to provide bonds of common interest between different nations, and in general is of paramount importance to human society. The transport system, once established, develops at its points of concentration the nerve-centres of the society it serves; and we can better measure the rise and decline of a State by the condition of its communications than by any other source.

Importance of Means of Transport. The importance of the means of communication and transport in the intricate and independent economic organisation of the modern times can hardly be over-emphasised. Transport is an essential link in the industry and the commerce of the world. Industry, commerce and transport are bound up together, for the development of one leads to the development of the other; industrial and transport development go side by side. The main geographical fact underlying the entire commercial structure of the world is that the different parts of the world with different environments yield different kinds of products or the same under unequally favourable conditions. This naturally results in the exchange of commodities and is bound up with transport facilities. Transport is thus the fundamental feature of commerce.

As we know few localities are capable of supplying all the many goods desired by the civilized man, so there is a great need for commerce. Commerce has been essential to the spread of civilization. Without commerce the natural wealth could not be made of great use. So the large scale production and the increased use of natural resources depend upon the development of the trade and the trade is first of all dependent upon transportation. Large scale production requires market. The means of communication have made the whole planet one wide market. Things produced in part can be moved rapidly and cheaply for delivery at the entrepôts. The earlier material culture and modern industrial and commercial prosperity were ultimately

the result of transportation. Means of transportation renders an important service not only in the distribution of goods but also in increasing the incomes or rents obtained from the land and the resources of nature. Increase of income, however, depends upon productivity and location, which is highly influenced by transport system. Urban development shows a great relationship to the transport development. A study of the important cities of the world reveals the importance of transport facilities with the exception of a few. But in any way, all the big cities of past or present owe their importance to transport facilities.

From an economic point of view transportation is a part of production. Production consists of making the matter more useful for the purpose of consumption, i.e., to give the matter ability of satisfying wants. For this the commodity must be given the form and qualities which the user desires. This is done through the change in form and change in place. Just as manufacturing creates form utility in commodities, so transportation creates place utility. When the commodity is moved from the place where it is needed, i.e. from the places of excesses to regions of deficiencies, the place utilities are created. In absence of transportation each region will produce all the things required by it in right quantities but rapid means of transportation permits different regions to specialise in those articles for which they are best fitted by nature. Without the development of adequate means of communication for facilitating the movement of goods and ideas, advanced stage of economic development is impossible. Indeed, there is a direct relationship between the adequacy of the communications of a region and its stage of economic development.

The development of transport has been a major factor contributing to the prosperity and progress of modern civilization. It has enabled the production of commodities to be greatly increased, and therefore, many kinds of goods which were formerly regarded as luxuries are regarded as necessities of daily life. Formerly people lived mainly in themselves—a self-sufficient existence. They manufactured their own clothing and implements and produced their own food, even though such commodities would be produced elsewhere. Specialisation awaited the time when the necessary raw material could be cheaply delivered at plant and the finished products cheaply distributed to the consumers. With the growth of cheap and rapid transport, production has developed at those centres where the conditions for it are the most favourable. Transportation has thus helped the geographical division of labour and given fillip to production.

.Different Modes of Transport. Many methods of trans-

portation have been utilized in the advance of economic development. Men, pack animals, canoes and row boats, sledges, carts, wagons, sailing vessels, steam-ships, rail roads, motor boats, automobiles and trucks and aircraft have been used successively for transport; and, curiously enough all are still used in some parts of the world.

KINDS OF TRANSPORTATION SYSTEMS

Land	Water	Air
1. Man	1. Rivers	(a) Aircrafts heavier than air
2. Animal	2. Canals	(b) Aircrafts lighter than air
3. Roads	3. Lakes	
4. Railways	4. Oceans	

1. *Human Beast.* Since the beginning, man has always been trying to solve the problem of transportation, and to a great surprise the first means he adopted to this end was his own body, adapting it to devices for lightening the burden as by putting a pad on the head or using a rope across the shoulders to hang the weight. The human body is the most universal as well as the most fundamental primitive means of land transport and human portage still prevails in many parts of the world. Though during the last century and a half great changes have taken place in the world communications, but even today, in less developed regions, transport is carried on chiefly by men and animals. In vast tropical forests where roads are difficult to be made, man is the chief carrier and also in the many isolated regions of the world. In the Savannas and more open forests of Africa Negro porters with heavy burdens on their heads, wend their way in single file along narrow paths that twist and turn like the trail of some absent minded snake. Throughout China and Tibet, coolies carry great loads through the narrow crowded streets of the towns and cities and overcrude tracks, for in this densely peopled land animals are scarce and human labour cheap. Even in areas where beasts of burden are available, it may not be possible for man to use them. The slopes of mountains may be too steep for animals as in some parts of China, Tibet and Chile, or harmful insects may prevent the use of transport animals as in Central Africa. In such regions heavy loads are moved by coolies. It is also important in regions though civilized but whose high density debars human labour to such an extent that other methods are considered unnecessary as in the case of China. The average carrying capacity of an Asiatic or African porter is, however, said to range between 55 and 66 lbs; when handling a wheel-barrow it ordinarily amounts upto 250 lbs. However, it is estimated that more than half of the world's population still depends upon human power for local transportation. This mode of transport is so expensive

that the cost of carrying goods to a distance of 150 miles is three times the freight usually charged for a voyage of 8000 miles.

2. *Animals.* Early people have shown no less skill in surmounting obstacles than in easing burdens. Before venturing upon the sea they mastered navigation on inland waters. Early use of shapeless rafts and boats of skins calked with reeds are instances of how man has made use of materials at hand. Ox hides are still used today for crossing rivers in Central Asia while strong liancs in tropical forests. Many other similar instances may be cited, which all demonstrate the varied origin of local inventions, each with the environmental stamp. In every region man has found some material for his use, sometimes flora and sometimes fauna. In regions where animals are numerous and the environmental conditions are unfavourable for mechanisation of overland transport, they replace human portage to a large extent. Man too by his cleverness and ingenuity, however, succeeded in domesticating animals for transportation. But the earliest domesticated animals were never tamed for the purpose of transportation. The dog, sheep and goat—animals which, in spite of services they may render on occasion, do not belong in this category,—though subsequently the ox, horse, donkey and camel, etc., were preceded without any doubt. Ox perhaps may have been the first beast of burden. In China it has widely been used and still today, plays an important part upon the plains where sugar beets are cultivated. In our country ox has been the most favoured animal from times immemorial. The use of cattle has always been very limited—as it still is. Especially in the country of ours, it needs no explanation, and no commentary, where it is the symbol of Mata (mother). But in France, even today nothing can take the place of the cow upon the mountain trails, nor of the buffalo in the paddy fields and swamps. In the thirteen century the ox was the most common animal employed for transportation purposes in trade.

But for general travel ox was surpassed by the animals which had been trained for this particular purpose in other environments. In open countries, where, because of scanty vegetation, herds in search of food formed the habit of covering great distances, the horse or the camel had developed qualities due to which they were mostly domesticated. The qualities of the spirit and the warlike bearing of the horse, no doubt attracted man and greatly contributed to its early adoption for military purposes and to draw the chariot. The qualities it later developed shows its great adaptability, resulting from the variety of different breeds. Such diversity has enabled it to occupy the immense domain extended from the habit of reindeer to that of elephant—not to mention its recent phenomenal increase in

America. In most European countries and in the Temperate lands, horse is by far the chief transport animal.

In Central Asia Bactrian species of the camel—with two humps—is generally used as a beast of burden rather than draft animal. It is capable of little speech, but by reason of its docility, its sense of direction and its skill in finding its own food near encampments, it is the animal fitted for long journeys lasting for months at a time and to play the role of ship on long voyages through arid regions. It is best adapted to deserts and steppe lands of the old world, due to its broad padded feet which prevent it from sinking into sand and withstand the dry conditions. Baggage camels carrying loads from 500 to 1000 lbs. are able to cover some 25 miles a day.

The ass is a native of Africa and was first domesticated in upper Egypt at the dawn of history, because the monuments show that it was as plentiful in the first dynasty as it is today. The services for which it was peculiarly adapted by nature were so important in countries of finely dissected topography, small land-holdings and local activities common all around the Mediterranean, that it multiplied rapidly and in the end became the family companion and the social support of the lower classes.

Different people in different places have made use of varied animals, in comparison with animals just mentioned above, for the purpose of transportation, which all have merely local significance. The elephant with its vigorous body is a war machine or the luxurious vehicle of a Raja rather than a domestic servant. But now they are greatly used for carrying loads in Monsoon lands of Asia, to cross swamps and thick forests, where no other animal could make its way. The four square, firm build of the Yak, with its short legs, makes it indispensable for crossing the heights of eastern Tibet, Andes and the Himalayas.

The Lamas, akin to the camel is a native of South America. The hardy dogs are the chief feature of the Canadian, North-West and the Tundra's transport. They draw sledges and carry a load of 500 lbs. to 800 lbs. over the hard frozen snow. The reindeer excels all others in Tundra, due to its swiftness and adaptability to the conditions under which it lives.

In short, from what has been said it is clear that in the different regions conditions were peculiarly favourable to the use of some sort of animals, both for carrying and for draft, and where, through imitation or competition, their use became widely prevalent.

3. *Vehicle Transport.* It is usually easier to drag a burden than to carry it, and this very fact led to such mechanical inventions as the rollers of the Assyrians, and later the wheel, upon the axle of which was built the cart. The exact place and

time of origin of the wheeled vehicle is not known, but it goes back into prehistoric times. Its invention marks one of the greatest forward strides in the evolution of transport. Most of our modern means of land transport, the automobile and the train, are but modifications of the original wheeled cart, mechanically powered so as to provide greater speed and pulling strength as compared with the human or animal drawn vehicle.

The wheeled vehicle has its own geographical domain. It has been developed in the interior of the great continents, in Asia, America and in South Africa where there are considerable areas suitable for its use. The cart-roads have been favoured by regional conditions wherever deposition proceeds at a faster rate than erosion, building up open surfaces only slightly dissected as yet and where in frequent rains leave the soil firm enough to bear the weight of a cart. Dunes and shifting sand are, on the other hand, an obstacle which must be met and overcome between the mountains which often enclose these interiors. Such surfaces are broad natural highways. Thus primitive modes of travel are branded with the physical environment. Already the superiority of certain regions for circulation and transportation is evident. So they become differentiated from others, and their differences are sufficient to affect intercourse, commerce and even politics.

4. *Road Transport.* The road is one of the great fundamental institutions of mankind. We forget this because we take it for granted. It seems to be so necessary and natural a part of all human life that we forget it ever had an origin or development or that it is as much the creation of man as the city and the laws. Not only is the road one of the great human institutions because it is fundamental to human existence, but also because its varied effect appears in every department of the State. It is the road which determines the sites of many cities and the growth and nourishment of all. It is the road which controls the development of strategies and fixes the sites of battles. It is the road which gives its framework to all economic development. In its most humble function it is a necessary guide without which movement from place to place would be a ceaseless experiment, and without which organised society would be impossible; thus the road moves and controls all history.

Of all the land routes, the road, including everything from the humblest path to the modern concrete highway, is the most ancient as well as the most universal. Ancient Rome recognised the strategic value of roads in facilitating the quick shifting of troops to any part of the Empire, and as a result highways were constructed, not only in Italy but over the Alps into the basins of the Danube and the Rhine, to the centre of Spain,

and even in England. Other ancient peoples such as the Chinese and the Incas built paved roads, but it remained for the Romans first to recognise separate roads into a system or network, all parts of which fed into one another. Not all peoples construct such permanent highways. Among the dunes of the Sahara are paths worn by camel trains of caravans, while porters' feet have left imprints upon the jungle sails and vegetation of the Congo. Every human establishment, no matter how insignificant, becomes the focus of roads, and the greater its attraction the greater the multiplication of trails leading to it.

The roads are the embanked lines of way, well drained, with easy inclinations and hard-smooth surfaces allowing the use of wheeled traffic with a minimum of resistance and carried by means of raised bridges over the water courses of the country. The cost of road building depends upon the nature of the country through which they pass. Thus roads are rendered expensive in Bengal by necessary embankments. The large amount of drainage to be crossed and inferior nature of the metalling stone, it uses, must be brought from enormous distances. Thus road making becomes very expensive in the hilly countries because of many bends, cuttings and bridges. Portions of the hills may need to be cut away before the road can be built.

The land routes are of profound importance in the inland trade of the country. For the long distance traffic railways provide the quickest and best form of transport, but for comparatively short distances motor cars are used. With the advent of the motor car transport, they have revitalized road transport, by it goods can be carried from door to door, whilst those sent by rail must be handled several times before reaching their destination; this means additional labour, expense and loss of time on short journeys. Again, motor traffic has made road making more expensive as the roads have to be metalled and made passable throughout the year. But road making is decidedly less expensive than the railway because the former can be constructed on any soil and it does not require the locking of a huge capital outlay in stations, platforms, yards etc. and it is also not very difficult to change the route if the traffic does not come up to expectations. The motor traffic suits the petty trader as it conveys small loads from point to point without breaking the bulk and the vehicle runs according to the convenience of the trader. Moreover, over short distances motor transport has begun to offer very effective competition, specially where two important cities either in the plains, or in the hills are connected by motor and railway routes.

The following table gives the total motor road mileage of the world:—

Countries	Motor Road Mileage (1 Km. equals $\frac{5}{8}$ of a mile)	Number of Motor vehicles (in millions)
U. S. A.	3,000,000 miles	30.1
France	650,000 Km.	2.2
G. Britain	177,000 miles	2.6
Germany	274,000 Km.	1.9
Canada	394,300 miles	1.4
India		

It will show how inadequately is India equipped with roads as compared to other countries:—

Countries	Road miles per sq. mile of area	Road miles per 100,000 of population
Japan	3.00	684
U. K.	2.00	277
France	1.89	1,392
Germany	1.19	565
U. S. A.	1.00	2,853
India	0.18	142

5. *Railroad Transport.* Railways are the important means of transport in the modern time. The influence of topography. Because plains are gently sloping and being flat offer ous. Surface features determine the railway route. The rail road is a relatively modern type of land route, not having been in use much more than a century. The first rail road was built in England in 1825, and it has followed the expansion of accidental civilization into the four corners of the earth. It is a product of the Industrial Revolution while at the same time it has made a complex industrial-commercial civilization possible. The course taken by a rail line is often quite different from that of a road. A train cannot negotiate steep gradient as can a motor vehicle so that rail lines are obliged to follow rather closely the major relief features.

In plains railways can go in all directions and nature offers no obstacle in their way but it is not so in the mountainous topography. Because plains are gently sloping and being flat offer no hindrance in the construction of railway lines. In hilly places, railways involve costly projects if they are made to ascend hills or mountains or to pass through a number of tunnels.

The railway builder's problem is said to lie 'midway between those of the road engineer and canal builder.' In constructing a railway line engineers wish to avoid steep gradients and minor slopes are lessened by cuttings and embankments, as the railway locomotives are incapable of ascending steep slopes; an ordinary locomotive having more than its own weight on a gradient of 1:20 fails to work at all, and working becomes difficult if gradients of about 1:100 are frequently encountered. In places where it is necessary to cross a highland area the line follows one valley towards a pass, and, having crossed or tunneled underneath it, descends by another valley.

The making of gradients and tunnels costs much money, and even when they have been constructed there are often heavy charges to pay on the money that has been expended. In addition more power is required to have trains up steep slopes, and both of these factors add much to the cost of transport in mountainous regions. In former days the Alps were a barrier to the weak and timid; today they bar the poor and forbid transport to all goods of large bulk small value that cannot pay the heavy freight charges.

Railways usually follow the shortest route between the places they connect, but owing to relief, the presence of broad estuaries or rivers, and stretches of marsh it is often necessary for them to make detours. The relief of the land is the most important factor affecting railways construction, and as a rule railways follow the low lands and avoid uplands. Wide stretch of water also often interferes with the construction of railways. These are mostly bridged over; in some cases, train ferries are used for the transfer of whole trains across the intervening water. The train ferry system has long been in existence over the channel lying between Denmark and Sweden and such communication has also been established between England and the continent via Harwich for ferrying goods and passenger trains across.

Climate is also another important factor. This is particularly so when underground railways are intended to be constructed because in the hot climate such railways are altogether unbecoming and as such there are no underground railways in India, but there is a net of underground railways in England. Heavy rainfall increases the cost of replacing and repairing of railways as in the case of Bihar and Orissa, where railway line and pebbles are washed away by the torrential downpour and its consequences.

Surface feature also determines the Gauge. Broad gauge in the plains and narrow gauges in the hilly areas are suitable. In broad gauge, the two rails are 5 feet 6 inches apart and the

engines are big and heavy and hence the trains can run very quickly like the E.I.R. Broadline. But the broad gauge railway is very expensive to build and the trains cost a lot of money to run. While in meter gauge the two rails are 3' -3-3/8" apart. The engine and trains are smaller and hence do not run so quickly but they are less expensive to build and to run the meter gauge railway lines.

The importance of the land routes in the international commerce is insignificant owing mainly to the greater cost of construction and the political obstacles. Generally railways and roads have to be built artificially at a high cost and have to be kept in proper order from time to time. Besides, a large amount of rolling stock has to be kept by railways, and services have to be run regularly whether traffic offers to the expectations or not.

International railway transport suffers from a serious disadvantage of differences of railway gauges in different countries. In Europe, Russia has a gauge of 5', Spain and Ceylon and Portugal 5'—5½" while other European countries have the standard gauge of 4'—8½". Some of the French lines have a gauge of 4'—9", while India has 5'—6' broad gauge and 3'—3-3/8" meter gauge. New Zealand, Japan and S. Africa each has a gauge narrow of 3'—6". In Australia there are three gauges—3'—6", and 4'—8½", in New South Wales, 5'—3" in Victoria and South Australia; and 3.6" in Queensland and Western Australia. U.S.A. and Canada have the standard gauge of 4'—8½".

The following figure gives the railway mileage of some of the important countries:—

Route Mileage in Leading Countries

France	25,600	U.S.A.	224,816
Germany	36,256	Argentine	26,710
G. Britain	19,151	China	19,000
U.S.S.R.	57,487	Brazil	21,251
Italy	11,383	India	34,705
Japan	12,556	B. Africa	13,413
Canada	41,158	Australia	26,623

But the mileage figures do not give a correct idea of the sufficiency of railways in a country. They should be taken in relation to the area and population served. The following table will give a comparative idea of the position of different countries so far as the railways are concerned.

Mileage of Railway per 1000 sq. miles of Area

U. S. A.	6.6.	Canada	1.0
U. South Africa	2.4	Europe excluding Russia	11.5
Argentina	2.0	Belgium	20.0
Australia and New Zealand	.9	U. K.	20.0
Russia in Europe	1.5	Germany	20.0
		India	2.2.

The following table compares the position of India with some other countries and the world generally in respect of electrification of the railways. It shows that there is almost a notable absence of electrification of railways in India:—

Electrical Railways in 1939 (Capital, March 21, 1940)

Countries	Electrical Route miles	% of the total Railway mileage
Italy	3,200	28
U.S.A.	2,700	1.1
Sweden	2,200	21
Germany	2,000	5
France	1,900	4.8.
Switzerland	1,800	50
Great Britain	1,000	4.9
Japan	450	2.3
India*	237	0.5
World	1,600	2.6
Central Rly. mi	181 Route miles	4.85% of its total mileage
Western Rly.	37	1 %
Eastern Rly.	18	0.7 %

Because of the high cost of road bed, construction and the rolling stock, the railway is a paying investment only when distance and length of haul can compensate for these handicaps. Its capacity for hauling large loads long distances at a relatively high rate of speed are the principal points of advantage which urged the rapid expansion of the world's mileage. Unlike waterways, collections and deliveries are not restricted to main lines, for by means of secondary lines and spur tracks small towns off main lines, and even individual factories, may have connections with the markets of the country and the world.

IMPORTANT TRANS-CONTINENTAL RAILWAYS

Now we will deal with some of the important Trans-continental railways, which are as follows:—

1. The Trans-Siberian Railway.
2. The Trans-Caspian Railway.
3. The Cape-Cairo Railway.
4. The Canadian Pacific Railway.
5. The Chile-Argentine Railway.

The Trans-Siberian railway connects Russia with the far East. It runs from Moscow to Valadivostok on the Pacific, the distance being 5,400 miles. The settlement of Central and Eastern Siberia is largely due to this railway system. It has additional value as an alternative route between Europe and Asia on the Pacific for passengers and mails. The line was constructed by the Czarist Government for the purpose of facilitating the work



Fig. 5. Trans-Siberian Railway

of administration in Asiatic Russia. It is a single track system. From Moscow the line goes to Omsk after crossing the Urals and the agricultural lands of steppes. From Omsk it soon reaches Irkutsk and lake Baikal. The line then goes from lake Baikal to the Amur Valley and passes through Manchuria and finally reaches Vladivostok. In Manchuria, a southern branch has been opened at Harbin which connects port Arthur via Mukden. Mukden is linked up with Peiping by rail.

The Trans-Caspian railway connects central Asia with European Russia. It is also a part of a possible railway route between Europe and India. The line runs from Krasnovodsk, on the Caspian Sea, to the heart of the cotton growing region of Turkestan, throwing off a branch of the Afghan frontier from Merv to Kushk. Krasnovodsk is connected with Moscow via Tashkent.

The Canadian Pacific railway was built during the years 1882-86. The length of the line is 3,500 miles. This line connects the Atlantic coast of Canada with its Pacific coast. This

line shortens the journey from Liverpool to China and Japan by 1,200 miles. The line runs from Halifax and St. Johns to Montreal. From Montreal it goes to Winnipeg, the great wheat centre of Canada. The line crosses the plains from Winnipeg via Regina and reaches Medicine Hat in the Rockies. Leaving Medicine Hat, it goes through Kicking Horse Pass and ends in Vancouver. This railway system has played a very important part in the political and economic life of the country. Geographical conditions like distance and climate placed considerable difficulties in the way of colonisation in Canada. Waterways rendered inestimable service no doubt but they were closed to traffic during the winter months. The Canadian Pacific Railway now permits the scattered population of the country to maintain constant intercourse.

The Chile-Argentine Railway of South America connects Buenos-Aires with Valparaiso; the distance is nearly 900 miles. The route was opened for traffic in 1910. As there is a change of gauge both at Medoza on the Argentine side and at Los Andes on the Chilean, the route is useful only for the carriage of passengers and mails. Of the four trans-continental lines in S. America none is more important commercially than the Chile-Argentine line. The interchange of products between the eastern and western zones of the continent is small.

Cape-to-Cairo Route. The distance from Cape to Cairo is 9,000 miles which is traversed by rail, river, lake and road. It was a scheme of Cecil Rhodes to connect the Cape with Cairo by an all-British railway system; but the scheme could not be worked out. A railway line from Cape Town goes upto the border of Belgian Congo via Bulawayo and Elizabethville. From Elizabethville, the capital of Kantanga, a river-cum-caravan route proceeds to lake Victoria, from where a motor road runs to the Nile Gorge. From here steamers maintain regular service to Khartoum. From Khartoum a railway line goes to Ktadi Haifa, thence by river-transport Shellal is approached. From Shellal a train runs to Cairo.

The following table gives the world railway traffic:—

. *Freight Net Ton-Kilometers*

Year	World	Africa	North America	South America	Asia	Europe	Oceania
1948	1,557	26.5	959	24.6	69.7	164	10.2
1951	2,152	34.6	1,098	29.9	138.3	275	12.9
1954	2,207	44.0	901	29.6	166.9	302	13.2

The following table gives the railway traffic in some important countries of the world (in 1954):

Countries	Passenger Km.		Ton. Km.	
	1946	1954	1946	1954
Egypt	2,224	3,263	1,477	1,458
Union of S. Africa	626	N. A.	14,589	23,234
Canada	7,481	80,752	4,599	84,756
U. S. A.	104,212	868,602	47,189	805,928
India	67,689	60,183 (1953)	44,119	47,356 (1953)
Japan	87,447	16,553	87,438	39,327
France	31,460	26,570	32,337	41,540
Germany	N. A.	33,207	24,400	52,056
Italy	17,105	21,876	8,900	14,004

COMMUNICATION BY VOICE & MESSAGE

The communication devices—telegraph, telephone, cable and radio—all convey ideas and messages with great rapidity. Almost all the places of the world can receive the news at almost the same moment. The different methods of communication are of great use to us geographically in many ways, as in forecasting the weather, in obtaining information on supply, demand and prices of commodities; in transmitting news of international tensions; and in conducting business affairs. The cable has been supplemented by the radio for trans-ocean messages, and the radio or wireless has proved a useful tool for business as well as for entertainment. Television may join the other means of communication in near future as an improvement tool, but at present it is limited to only small local areas of reception.

The modern methods of communication are at best utilised greatly by the industrialized parts of the world. About one-half of the world's telephones are in use in the U.S.A. and one-third are in Europe. U.S.A. has one-third of the telegraph mileage and much of the rest is in Europe.

The first oceanic cable was successfully laid across the Atlantic in 1866, and several are now in operation. Cables across the Pacific have been laid from Europe to South America, Africa and Australia. England's cable system extends around the world and controls about half of the world's cables.

The utility of radio is not only for sending messages but also for guiding airplanes through storm and fog, for communication with ships at sea, and for many military purposes. It has proved a valuable advertising medium and disseminator of news.

CHAPTER 10

MEANS OF TRANSPORT (Contd.)

WATER TRANSPORT

River navigation is of decreasing importance, especially in those countries which are better provided with railways. That river transportation has not been able to compete with that by rail is due to important defects in the natural qualities of rivers as water thoroughfares. Such defects are:—

(a) The depth of most rivers fluctuates greatly with the seasons of maximum and minimum rainfall. This is notably true in arid and semi-arid lands where water courses so seldom are navigable that they never have had significance in that connection, except under special conditions, such as are found in the Nile. Even Missouri in regions of seasonal and highly variable rainfall, often is so shallow as to become incapable of use.

(b) Young streams, which have fairly direct courses, commonly are interrupted by falls and rapids, while old streams of low and uniform gradients usually meander and provide long and indirect courses (routes) of transport.

(c) Old streams constantly shift their channels and deposit sand bars which are a menace to navigation.

(d) In some climates rivers are closed to navigation for several months each year by ice.

(e) It is difficult to provide on the banks of a river—having a variable depth and shifting channel—adequate facilities for the transfer of heavy cargo between bank and boat.

(f) Many places from which goods must be moved are not reached by navigable streams and must provide other kinds of transport facilities.

(g) The movement of river craft is comparatively slow and especially so against the stream current.

The use of large lakes or inland seas of the world for navigation presents less difficult problems than does the use of rivers. Some are closed by ice part of the time. Owing to their position between the principal iron-ore and coal regions of the continent, the Great Lakes of North America have been provided with special craft and organised into one of the most effective routes of transportation in the world. Some of the lakes of the other continents serve the transportation needs of their regions well. Among the most used of them are the three great Lakes of Victoria, Nyasa and Tanganyika in the Eastern Africa; the Caspian Sea and the lake Baikal in Asia.

Rivers are natural roads, connecting the coast with the heart of a country. By following them, communication is made comparatively easy. Rivers increase in importance as countries become more thickly settled and manufactures grow. The great rivers of Europe—the Rhone, Rhine, Elbe, Oder, Vistula, Danube, Dnieper, Don and Volga have for centuries been channels along which much of its trade has followed. Great trading cities have arisen at their mouths and on their banks.

A river to be of greatest value for trade, must be free from falls and rapids. The centre of Africa is a plateau, and most of the great African rivers or the rivers of Deccan, *viz.*, the Congo, Nile and Zambesi, form rapids where they fall over the edge of the plateaus to the coastal plain. This makes them of little use as a means of communication between the coast and the interior, although above the falls a brisk trade is carried on up and down stream.

In the second place, a river must be ice-free all the year. The St. Lawrence and Lower parts of Obi, Yaneisi, and Lena, are ice-bound in winter and during that season much trade is diverted to the ports of Halifax in Nova Scotia, and St. John in New Brunswick, which are open all the year, while there are no good ports on Siberian coast and hence most of the trade is carried on by land. Great inconvenience is experienced when the icebound rivers are almost the only means of penetrating into a country, as in the case of the Yukon.

A third hindrance to the commercial usefulness of rivers is the formation of bars or deltas at their mouths. These are caused by the sediment which a river brings down with it. The Mersey, Thames, Seine, Noire and Garone and Ganges would become choked by bars but for constant dredging, and thus the ports of Liverpool, London, Rouen, Bordeaux, Nantes and Calcutta would be ruined.

The chief rivers used as highway of commerce are:—

1. Yangtse in China.
2. Rhine and Danube in Europe.
3. Murray-Darling in Australia.

YANGTSE AS A HIGHWAY OF COMMERCE

Yangtse, 3,200 miles in length, is the sixth longest river in the world and by far the most important waterways in China. The Yangtse provides a splendid avenue of communications. Next to Rhine it may be the busiest river in the world.

Though it is the great means of communication throughout its basin, but its value as such varies greatly at different

seasons and at different places. During the summer months the river rises rapidly as a result of the heavy monsoon rains. At Hankow this rise averages between 40' and 50', but in the gorges above Ichang it may be between 60' to 100'. At this time the lakes lying on its either sides are filled by back water from the river, so much so that Tungting lake then has a size of 50 to 75 miles and the Poyang is nearly as large. But during the winter the basin becomes nearly dry.

Yangtse flows through a region of three times the rainfall of Hwango and carries much more water. But disastrous floods are rare because of the marginal lakes—Tungting, Poyang and Tai—and the network of smaller water ways which serves reservoirs for the storage of surplus flood waters of the river. The Yangtse is not overloaded and is able to carry its burden of sediment to the sea. This load amounts to 600,000,000 tons a year, and its deposition in the delta is advancing the shore-line one mile every 70 years.

Where islands divide the river, there are a few troublesome sand bars; elsewhere the channel is sufficiently deep for the ocean steamers of 4,000 tons to reach Hankow 630 miles above Shanghai by a channel of 28-30 ft. wide, at all seasons and for 10,000 ton boats in summer. River boats easily reach Ichang at the foot of the gorges 1000 miles from Shanghai. This inland port of Hankow normally hands 5% of China's foreign trade. Thus it is clear the big steamers reach about 1400 miles into the heart of the western China, while the small steamers can go even considerably farther though they are handicapped by low water in winter when junk traffic is easier.

The chief tributaries of the Yangtse are the Min Kiang in Szecrwan, on the north is the Han, at whose mouth is Hankow, and two large tributaries flow in from the south—the Siang which flows through Tungting lake and meets at Yockow and the Kan which reaches the Yangtse via the Poyang Lake and meets Yangtse at Kinkiang.

Now area in the world has such a network of Canals as the Delta around Shanghai is intersected by a network of canals. Most of these canals are navigable for small boats and these waterways are the roads of the region. Their total length has been variously guessed but greatly underestimated. They are especially abundant south of the Yangtse and east of the Tai lake. In one square mile they have a total length of 27.8 miles, with an average spacing of about 380 ft. The mileage in this small part of the delta may thus nearly be put about 150,000 miles, and for the region as a whole there may be a quarter to half a million miles of navigable waterways.

A number of important trading centres have grown upon the banks of the Yangtse. Chungking is the port of Szchewan, while Ichang is the port of transshipment for goods going to and coming from that province, Chinese junks meet steamship here and transport the goods where steamships cannot reach. Hankow is the great commercial centre of China. Kingkiang situated on the Yangtse is the great collecting and distributing centre for the rich province of Kiangsi. Shanghai situated on the R. Whangpoo about 12 miles from its confluence with Yangtse is a great commercial entrepot not only for the Yangtse basin but for the whole of North China. "Shanghai the gateway of this great valley, is one of the greatest ports of Asia and of the world. It is both the New York and the New Orleans of China, with $\frac{2}{5}$ of its foreign trade."¹

"The Yangtse is the greatest of the river thoroughfares by which the commerce of Asia has been supported. Running from west to east through the heart of China it has nearly a thousand miles of waterways for ocean steamers and much more for native boats. The Yangtse is the great commercial artery of China for two reasons—firstly, because it has navigable branches flowing into it from north and south, and a far reaching system of canals that open up great tracts of territory.

Secondly, because there are tremendous populations dependent upon these waterways."²

RHINE HIGHWAY OF COMMERCE

Rhine is one of the world's most important commercial rivers. Though not conspicuous for its length, its volume or the size of its drainage basin, it carries in a normal year over five times as much traffic as the Danube and half again as much as all the other rivers of Germany combined. It is customary to think of the Rhine as a German River, but actually, its basin is shared by four countries, viz., Switzerland, France, Germany and Holland.

This river has been under the control of an International commission. It is 800 miles long and carries vastly more commerce than the whole of the Mississippi system. It has been dredged and straightened and otherwise improved, and many cities on its banks have built docks equipped with modern devices for loading and unloading cargoes. It is not a deep river, ranging between 6½ ft. in the upper stretches to 10 ft. in the lower. In spite of all these facts, Rhine happens to be one of most remarkable of the flowing roads, as it leads from the ocean to the very heart of the continent.

¹ R. Smith, p. 774.

² R. Smith, *Ibid.*, pp. 773-774.

The favourable conditions which have made the extended use of this river are:—

(1) Its comparatively even flow and freedom from prolonged freezing. Flowing from the highlands of the south, this river trends not north but north-west following the slope of the plain. The ample precipitation and the melting of snow of the Alps gives this river considerable volume of water thus making it commercially usable.

(2) It passes through the densely populated industrial region whose raw materials and coal require cheap transport. As a result of the availability of vast quantities of the lignite, coal, salt and iron ore along or near the Rhine, the Rhine region has always been one of the most highly populated regions of Europe. The Rhine has some 20 important cities on the river or directly tributary to it. Really speaking, at every 30 miles on the average, a city of 100,000 persons is met with on the banks or in the immediate vicinity. Moreover, great coal and iron mines are near, and a large tonnage of heavy, low-grade freight is available.

(3) Its use as a link in two of the most important routes across Europe, i.e., the French city of Strasbourg and the German town of Kehl, on the opposite bank, lie at the crossing of the great north to south highway of the Rhone-Rhine valleys, and the great east-to-west route of the Orient Express between Paris and Constantinople.

(4) The location of its mouth in the world's busiest water—the North Sea. This is a privileged position as compared with most other rivers of Europe.

(5) Extensive artificial improvements such as deepening, straightening and the building of many terminals and artificial harbours. In addition canals have connected the Rhine system with the basins of the Rhone, Saar, Scheldt, Meuse. By means of canals now under construction the Rhine is to be connected with the Danube and the Vistula with the Dnieper in Russia. Thus the Rhine valley provides a short, direct north-to-south and east-to-west international routes through the Hercynian mountain systems of Central Europe.

(6) No river in Europe can compete in the amount of traffic carried because the richness in agriculture or minerals of the lands on either side further contribute to the amount of traffic. It has been estimated that in normal times over 10,000 vessels navigate the Rhine. Below Mannheim the river is busy thoroughfare with trains of four or five barges dragged by powerful tugs as the most common carriers and coal, iron ore, stone, cement, and lumber constitute the main tonnage. The

main contributor to this traffic is the Westphalian industrial area which lies on the northern border of the Rhineland.

(1) *Sections of the Rhine.* The whole of the Rhine river may be divided into a number of sections from its source to its mouth. Within Switzerland the Rhine is of little commercial importance. It rises in a glacier on the flanks of St. Gothard, only 12 miles from the source of the Rhone. After passing the Boden sea, where it leaves its sediment load, it runs westward to Basle forming the boundary between Switzerland and Germany. This international section is full of rapids and falls suited for generation of white coal but of little use for transport. Basle is usually considered the head of navigation, but as a matter of fact, the water borne traffic of that city port is very small. The valley from Basle to Mannheim is a naturally graded thoroughfare for railroads and of far greater importance commercially than the stream itself.

(2) From Basle to Bingen where the river meanders over the flood plain of the Graban valley, the course has been much altered by straightening the channel. The rift valley extends from Basle to Bingen. In this section of its course the river flows through a deep trough, averaging some twenty miles in width and 180 miles long between the Vosages and Hardt mountains on the west and the Black Forest and the highlands of Odenwald on the east. This rift valley is important both for its agriculture and its relation to the main highways of Europe. The highlands surrounding the Rhine rift valley are still extensively forested. Except for the large river ports such as Mannheim (at the Neckar confluence) and Mainz (at the Main confluence) most of the larger towns are situated away from the river flats and lie along the foot of the hills. Above Strasbourg, the traffic uses the Rhone-Rhine canal rather than the river itself. The depth of the channel varies from 6.5 ft. at Mannheim to almost 10 ft. at Koln.

(3) The Gorge section from Bingen to Bonn is one of the most picturesque portions of Rhine valley. Sheer cliffs are crowned by the famous Rhineland castles, and the hillslopes are terraced with vineyards and orchards of cherry trees. Whenever there is a sufficient width of lowland between the river and plateau edge, towns have developed. The chief town of Rhine Gorge is Coblenz situated at the confluence of R. Mosella and R. Rhine. Between Bonn and Coblenz factories of various kinds are rarely out of sight and villages succeed each other almost without a break. The gorge section between Bonn and Bingen is so narrow—as the R. Rhine and Moselle have cut deep valleys, and the mountain slopes drop so steeply to the river—that the construction of roads and railways is difficult.

(4) From Bonn to the Dutch Frontier the Rhine again winds back and forth over the great and broad European lowland. At the place where Rhine leaves the hills for the plains is a town of Roman origin-Cologne, which controls the routes along the Rhine valley and east and west along the northern edge of the highlands. Above it lies Dusseldorf a river port famous for the textile centre of Berman-Elberfeld to the east cotton manufactures on the west. Below it lies Duisburg, at the confluence of Ruhr and Rhine, which is a river port for Ruhr coalfield and its industrial area. It will thus be noted that from Cologne to Duisburg Rhine passes through one of the most industrial regions of Germany.

(5) After passing through Duisburg the Rhine reaches over the Netherlands and forming a vast delta falls in the North Sea. On one of its tributaries. R. New Mars, lies Rotterdam, while other commercial outlets are Hanover and Amsterdam.

Thus it will be recollected from the foregoing description that R. Rhine is the most used river chiefly because of its exceptionally favourable location and because ocean going ships can ascend its lower course to the great industrial region of the Ruhr.

DANUBE AS A HIGHWAY

The Danube has long been one of the greatest thoroughfares across Europe. Although it is not so important a highway as is the Rhine, the Elbe or the Volga, but it flows through or along a number of countries. This river is known as Donau in Germany and Austria; Duna in Hungary, Dunav in Serbia; and Dunarea in Rumania. This river twice entirely crosses the central chains of mountains once at Wien and once at Iron Gate.

The Danube is the great drainage artery of Central Europe and is the only large river which flows eastward a considerable distance. In length and drainage area it is exceeded only by Volga, which it surpasses in volume. The divides separating the Danube from the North Sea Baltic drainage are so low that three canals have been made so as to facilitate water routes entirely across the continent. These canals attain the maximum heights of only 870 ft. on the Oder. Danube route; 1214 ft. toward the Main and 1870 ft. toward the Rhine.

It is navigable by river steamers to Ratisbon in Germany, and by smaller boats to Ulm. It rises in the Black Forest and flows for 1700 miles eastward to the Black Sea through regions of structural, climatic and racial diversity. The Danube basin is shared by six countries, viz., Germany (including Bohemia and Moravia) Switzerland, Hungary, Yugoslavia, Rumania and Bulgaria, and because of the problems of navigation that may

arise it has been internationalised being controlled by Britain, France, Italy and Romania.

The whole course of the river may be divided into three parts, *viz.*, the Middle Danube, the Upper Danube and the Lower Danube.

(1) The upper Danube is entirely within Bavaria. At certain seasons barges of 100 tons ascend to Ulm, but only lumber can be carried so far and therefore the total traffic is small. Grain is usually unloaded at Passau. The upper Danube rises as a rushing torrent in spring and early summer, when heavy rains in the Black Forest and the melting snows in the Alps provide enough water but in other months it is usually a small stream. It flows first north-east to Ratisbon and thence south-east its direction being directed by the Bohemian block. At Linz it enters the narrow Austrian Gate formed by the approach of the Alps from the south and the Bohemian block from the north. Leaving the Austrian Gate the river flows across the plains of Vienna to Bratislava (Pressburg) where the river after receiving a small important tributary the March-crosses the Alpine system by a narrow gap-Pressburg or Bratislava Gate.

(2) Beyond Bratislava the Danube is known as the Middle Danube and includes the stretch between the narrow Passau and the Iron Gate obstructions occur near Bratislava and near Budapest. The Danube crosses the Little Hungarian plain and turning sharply south crosses the Bakony Forest by the Hungarian Gate at the south end of which lies Budapest. These spurs and forests divide the middle Danube section into three basins—the Vienna plain; the little Alföld and the featureless Hungarian plain. A series of its right angled bends occur in its course as at each of the confluences of the Drava, Sava, and Tisa. At these junctions the main stream takes the direction of the tributary stream. Beyond Belgrade, at the confluence of the Sava, the Danube flows eastward and once more crosses the Alpine system by Iron Gate—between the Transylvania Alps and the Balkan Mountains. The principal cities on the middle Danube are points where the river narrows and the land routes focus.

(3) The Iron Gate marks the division between middle and the lower sections and is the site of the most serious obstruction of river from Austria to its mouth. In spite of a channel blasted through the narrows in 1896 the rapidity of the current and the narrowness and crookedness of the course make the passage dangerous and expensive. Special tugs have to drag barges up through the rapids, and the narrowness of the channels closes it to larger vessels. After passing the Iron Gate, the river enters the Walachian plain of Rumania but before reaching the

Black Sea its course is diverted northwards by the low plateau of Dobruja. At its right angled bend near Galatz it receives the Seret and Prut and thence flows eastward to the Black Sea.

The traffic on the Danube is smaller than Rhine and smaller than that on the Elbe or the Berlin canal system. The reason for this slight use are partly due to physical characteristics of the land through which it flows and partly to political and economic restrictions.

(1) In addition to the difficulties of the swift current in various narrows and marked fluctuation in volume particularly in the upper course there are other obstacles to navigation.

(2) The river freezes only locally, so that floating ice greatly hinders the navigation, e.g., at Galatz, the ice form blockades for three months on an average, as a result of the ice and the low water, the traffic in winter is greatly reduced so that it is only half as much as in summer although winter is the time of heaviest grain movement so that the need of waterway is the greatest.

(3) Another disadvantage of the Danube is the direction of flow, from an industrial region to a raw material producing region.

The Danube valley provides a graded course for railways which are serious rivals of the rivers as highways. The important railways from Danube to the Aegean and Bosphorus avoid the Iron Gate and the long round about route via lower Danube by leaving the Danube at Belgrade.

THE IMPORTANT INLAND CANALS

(1) *Sault Sainte Marie Canal*. The "Soo Canal" as it is called is the greatest ship canal in the world. It has been constructed to avoid to fall in the St. Mary River between Lake Superior and Huron. The river drops 20 ft. in less than a mile and obstructs through-traffic between the Lakes. The Soo canal consists of two canals, which have five great locks, four on the United States side and one on the Canadian side. The Davis and the Sabin locks are longest in the world. On an average about 100 ships pass the canal every day during the navigation season, which lasts as long as the locks are not frozen, viz., 8 months. Both the United States as well as Canada take on their canals a huge amount of traffic: it is 3 times that passing through the Panama canal. This lake was constructed between 1889 and 1895. It is little more than a mile long.

(2) *Kiel Canal*. This canal was constructed in 1895 and enlarged in 1914. It connects the Baltic Sea with the North Sea and runs across the south of Jutland from Kiel on the Baltic to the Brunsbüttel on the mouth of the Elbe. It is about 61 miles

long, 140 ft. wide and 40 ft. deep admits the vessels of over 30' draught., and has locks at each end and that the eastern end is seldom closed, while that at the western end is kept open for 3 or 4 hours in every tide. It has been of great value to Germany for naval purposes as well as for commerce. It is open to the vessels of all nations and of any size, and has shortened the distance between England and the Baltic by about 240 miles, in time of three days, for sailing vessels, and twenty two hours for commercial steamers, from the mouth of the Elbe and saving a greater or less amount for all. North Sea ports to the south of Lyne. The Baltic ports of Stealin, Lubeck and the Russian ports of Leningrad use this canal as the quickest way to and from North Sea and Atlantic Ocean.

(3) *Manchester Ship Canal.* It was opened for traffic and to enable vessels to bring their cargoes of cotton to Manchester without rehandling them at Liverpool, on 1st. Jan. 1894 and this has made Manchester a sea port for steamers of 12000 tons capacity. It runs from Eastham to Manchester a distance of about 36 miles. Ships full of cotton from New Orleans and Bombay come here to Manchester and in its exchange is sent the coal and the manufactured cotton goods to various parts of the world. This canal was constructed at a total cost of £. 15,000,000.

(4) *Corinth Canal.* A ship canal opened in 1893, has been cut through the isthmus of Corinth, but its narrowness, less than 100 ft. at the surface and the strength of the current which sometimes flows through it, cause foreign steamers to avoid it.

(5) *Grand Imperial Canal.* In China Grand Imperial Canal, 700 miles long runs through nearly the whole length of the plain. Commencing at Hangchow, it crosses both the Hwangho and Yangtsekiang, and terminates at Tientsin. Not being kept in proper repair, this canal is no longer navigable throughout its length. Between Hangchow and Hwaiianfu, it is navigable for fairly large vessels. In the remaining course its depth is not more than 6'.

(6) *Moscow Canal.* A canal connects Moscow with 5 seas, viz., the Baltic, White, Black, Caspian and Azov. This canal has 11 locks, 12 big dams, 8 hydro-electric stations and 2 tunnels. The most impressive engineering feat is the raising of Volga waters, flowing backward to Moscow river over a hill nearly 120' high. But owing to severe Russian winter the canal remains ice-blocked and so is useless for 6 months.

The use of the canals and rivers in the movement of traffic in the modern time is not so important as in the past, chiefly owing to the competition of railways which have several advantages over canals. In case of railways a great cost is involved

in constructing them as they have to be artificially constructed and have to keep in proper repair. A considerable amount of rolling-stock has to be maintained by the railways, and trains have to run regularly whether traffic offers or not. This factor of great cost is compensation in the form of great speed of railways than canals. Other advantages are that the railways can reach any place to load or unload traffic without breaking bulk while the canals cannot do it. Again, railway sidings can easily provide facilities for storage of goods till need arises so that goods need not be sent to the warehouse immediately after their arrival. The advantages of sidings in England have enabled the railways to snatch the coal traffic from the canals, for all the canals together do not carry as much coal in a year as a single railway passing through the important coal-mining district.

While on the other hand, the working expenses of the canals are less because the amount of rolling stock needed is not as large as under railways. But if water transport is less costly, it is less quick. Therefore, the commodities preferring railways, will be those which are sufficiently costly in proportion to their bulk and weight so as to be able to bear the high transport charges. On the other hand, the commodities which prefer canals are those which are cheap in proportion to their bulk and weight and in the case of which swiftness is not a great consideration.

SUEZ CANAL

The Suez canal is the biggest ship canal of the world. It was cut through the Isthmus of Suez to join the Mediterranean and the Red Sea. The narrow Isthmus of the Suez was always an important factor in the trade between Europe and Asia, for caravan carried goods across it from the Mediterranean to the Red Sea. This route throughout much of its course follows relatively constructed water ways, which jeopardizes its safety in time of war. In the middle of the last century a French Co., was formed to construct a canal through this Isthmus and Ferdinand De Lesseps, a French engineer completed a sea level canal in 1869 at a cost of £. 18,000,000.

The canal is nearly 101 mile long from Port Said to Suez. Its minimum depth is 36 and breadth is 100 ft. It is at sea-level throughout and hence it has no locks like the Panama canal. It passes through heart of the old world and touches more lands and serves more people than any other route. On this route fuel is available at two ends—oil in Burma and East Indies and coal in Western European countries. This canal is therefore very advantageous in this respect than Panama, which route is devoid of any fuel supplies on the either side of it except those of the U.S.A. oil fields. It is also admirably provided with

ports and coaling stations. Gibraltar, Malta, Suez, Aden, Bombay, Colombo, Calcutta and Singapore are important ports on this route. This route can be considered to a trunk route from which emanating branch lines reach the smaller terminal ports. From every gulf and sea along the route a branch line joins with the main traffic route. The speed of the ships passing through this canal is limited to the maximum of 6 miles per hour and it generally takes 15 hours, for the ordinary cargo-ship to cross the canal. The width is not enough for two big steamers to pass side by side and therefore one of the ships has to be tied up along the side to allow the other to pass.

The canal makes use of a series of salt lakes. From Port Said to Kantara, it runs nearly due south together with the road, the railway and the Sweet water canal. At Ismailia, the Isthmus rises to its highest level of 52 ft. above sea-level and canal enters lake Timsah (Lake of Crocodiles). The stretches of the canal between lake Timsa and the Great and Little Bitter lakes lies in the land full of ancient ruins which speak abundantly of the old civilization. The lake emerges from the Little Bitter Lake and continues to Suez the eastern gateway of the canal.

The greatest effect of the canal was to shorten the distance between India and England by about 4000 miles or about a fortnight's steaming for the fastest vessel of the days when the canal was opened. Before the construction of this canal the route for the Eastern Trade was via Cape of Good Hope. But now the opening up of Suez canal has diverted much traffic from the cape to Suez. This canal has a big strategic importance for the trade between Europe and the far East as it has affected a considerable saving of distances between different parts.

From Liverpool To	Bombay	Batana	Hongkong	Eydney
Via Cap	10,730 m.	11,205 m.	13,195 m.	12,626 m.
„ Suez	6,189	8,516	9,785	12,235 m.
Distance saved	4,541	2,689	3,410	391 m.

The canal is of utmost importance to U. K. for it connects U.K. with her Eastern colonies and dependencies. In order to keep the passage through the Mediterranean the British fleet guards the entrance at Gibraltar and the exit at Suez. The canal is so vital to British trade and interest in the far east that the British bought a large number of shares in the canal company and so have a direct interest in the canal.

The canal is largely used by the ships of all countries. According to the international convention and law the Suez canal is "free and open in time of war as in time of peace to

every vessel of commerce or of war without the distinction of flag." Recently the proportion of the British ships using the canal is falling and that of the Japanese, Indian and other shipping is increasing. Of the shipping engaged in carrying merchandise in 1936 nearly 58% was owned in Britain; 11% in Holland 8% in Germany; 7% in France; 5% in Italy; 4% in Japan and 3% in U.S.A. Nearly 6000 ships pass this canal every year. The dues are very high as compared to those of the Panama canal so that it is only used by vessels carrying mails and valuable cargoes requiring rapid passage.

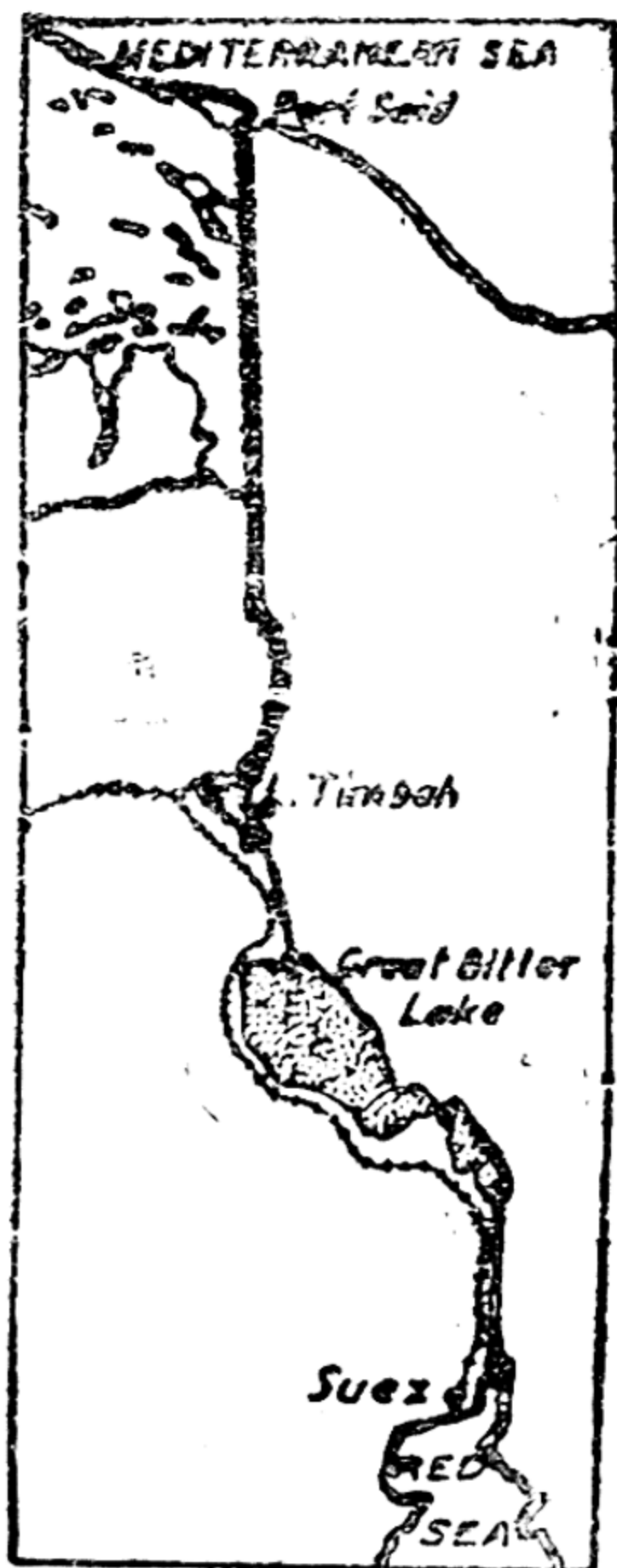


Fig. 32—Suez Canal

The cutting of the Suez canal has twofold effect. In the first place, since the winds in the canal region were too weak for sailing ships a new type of vessel was evolved, propelled both mechanically by steam and naturally by wind. The second effect was to direct the growing trade to Australia from the

Cape route. The latter effect was due to the shorter distance and partly to the absence of coaling stations on the longer route being that the presence of so many coaling stations thereon makes possible frequent refuelling and so enables the ships to increase their cargo-space at the expense of bunker space.

The vessels passing through Suez, as a rule deposit part of their cargo in their way to different ports and therefore are no longer fully laden. Moreover, the cargoes from far East and from South Africa to the west are less bulky and less valuable than the outward bound cargoes. The result is that on balance the load index of vessels entering into Indian Ocean *via* Suez is relatively low, whereas that of vessels leaving the ocean's is extremely high. The relatively high amount of tonnage passing through the Suez canal South to north as compared with that passing from north to south is also increased by the facts of Australian Trade. On the average shipping proceeding through the canal from north to south carry rather less than half their estimated possible cargo tonnage, while those going in the reverse direction are almost full to capacity.

Trade between East and West is almost as old as civilisation. But it was mostly trans-continental trade that followed different routes in different periods of the history. In the earliest days of this trade the East (particularly China and India) used to export manufactured fabrics and costly raw materials like silk, spices, precious metals. With the change of route from over-land to overseas this trade has undergone a revolutionary change in the nature of merchandise handled so that now bulkier commodities are being exported from east to west.

The nature and quantities of the principal goods concerned which come from north to south are a great variety of miscellaneous goods most of which are manufactured, machinery of all sorts, iron and steel works, Welsh coal, manufactured goods, clothing and varieties of the industrial products of Europe's manufacturing activities. While the merchandise leaving the Indian ocean, i.e., the articles of trade from south to north generally consist of staple products most of which are food stuffs or raw materials. "The wheat, wool, gold, and copper of Australia, the wool and much of the mutton of New Zealand, the teas of India, Ceylon and China; the sugar of Java; the jute of Bengal; the wheat of Punjab; the cotton of Deccan; the sugar and tobacco of the Philippines; the rubber of Ceylon and Malaya; the dates of Persian gulf; the coffee of Arabia; the Soyabeans of Manchuria; the tin of Straits Settlements; the petroleum of Persian Gulf and Burma, the cloves of Zanzibar; the pearls and pearl shells of Burma and Australia; the copra of the Pacific

Islands the rubber, ivory and hides of East-Africa—all pass through the Suez Canal to Europe.”³

This makes it clear that this canal is bounded by countries of distinct economic group—food and raw material importing countries like Germany, France, Great Britain, Italy and Japan, and raw materials exporting countries like China, Thailand, Malaya states, Burma, Dutch Indies, India and the middle East. The progress of Traffic through the Suez Canal from 1870 to 1955 is as follows:—

Year	Tonnage	No. of Trips	No. of Passengers
1870	436,609	486	26,758
1900	9,738,152	3,441	282,511
1930	31,668,759	5,761	306,202
1955	115,756,398	14,666	N. A.

The following table gives the tonnage of goods loaded in international sea borne trade and the part which passed through the Suez Canal in 1955:—

Via Suez Canal

		World Total (Million metric tons)	Total (Million metric tons)	North- bound	South- bound
<i>Ocean Shipping :</i>					
Dry Cargo	.. ..	430	38.7	20.5	18.2
Tanker Cargo	.. ..	360	68.8	66.9	1.9
<i>Great Lakes Shipping</i>	.. ..	28	..	..	..
Total	.. ..	818	107.5	87.4	20.1

The approximate values in 1955 of the trade of the important users of canal outside the Middle East are given below:—

Value in million U. S. Dollars

Countries	Exports		Imports	
	Total value	Via Suez percentage of the Total	Total value	Via Suez percentage of the Total
Australia	1,800	60	1,940	60
New Zealand	720	85	700	65
India	1,280	50	1,360	55
Indonesia	930	35	600	45
Malaya	1,360	40	1,250	25
Pakistan	400	50	290	35
U. S. A.	15,500	3	11,400	4
France	4,800	10	4,700	20
United Kingdom	8,500	30	11,000	30

³ R. Brown, *The Principles of Economic Geography*, pp. 170-171 (Fourth Edition).

The canal however has got certain drawbacks. It is narrow and shallow and therefore large types of vessels cannot pass through it. This defect is now being removed by widening and deepening the canal. It is, therefore, now possible for ships over 40,000 tons to pass through the canal.

More recently, however the rapid development of more efficient engines and the ability of the newer ships to cover a greater steaming distance for a given quantity of coal, combined with the desire to avoid canal dues and the loss of time through calls at many ports, has caused steamship lines working the Australian routes to use the Cape route rather than the canal route. The canal, however, remains the main means of communication to India and Eastern Asia as long as the sea journey round Africa is awaited.

PANAMA CANAL

The French engineer De Lesseps attempted to construct the Panama canal through a very difficult country covered by Jungle. But his attempt proved to be failure because of the rampant yellow fever and other diseases. Finally the Panama canal was built in 1914 by U.S.A. Government. It connects the Pacific and Atlantic oceans by cutting through the Isthmus of Panama. The terminus on the Atlantic side is Colon, while that on the Pacific coast is Panama. It is 50 miles long from deep water to deep water in the ocean of which only 15 miles are at sea level. Its maximum depth is 40 and its width varies from 100 to 300' and the time taken to pass through the canal is 10 to 12 hrs.

There was one great difficulty for the ships crossing this canal and it was that the level of the canal is heightened than that of the surrounding ocean. This difficulty is overcome by the construction of three systems of locks. By the help of these locks ships are raised to height of 85' and again lowered to sea level so that ships can pass both directions without any congestion of traffic. All the three locks are doubled in order that passing of ships need not suffer delay, water of the canal is got from R. Chagres, which is fed by the abundant rainfall. By the construction of a great dam across the lower valley of this river the immense Gatun lake was formed. This not only prevents the destruction of the canal by the violent floods of this capricious river but ensure a plentiful supply of water for the high level reaches of the canal. Excess of the water in the lake can be drained off to the original lower Chagres valley by the spill-way capable of passing 137,000 cu. ft. a second.

As the Panama canal passes through an undulating surface

covered with dense forests, the engineering difficulties had been much greater and the labour supply much less. The Panama canal generates its own hydroelectric power with which not only lighting of the region is done but also electric locomotives are supplied to pull ships through the Locks.

The main results on the opening of the canals are:—

1. The route from England to New Zealand is slightly shorter by Panama canal than by Suez canal. Thus, for example Sydney is some 12,400 miles from Liverpool by Panama canal while it is only 12,200 miles by Suez canal. Thus Europe has received little benefit from this canal.

2. Although the Panama does not shorten the route from England to Australia it does shorten the route from the ports of Eastern America to Australia. Thus Sydney is 13500 miles from New York by Suez canal but by Panama it is only 9700 miles.

3. The ports of Eastern Asia are still nearer to European ports via Suez route is not affected. However all parts from Hongkong north wards and east wards (e.g. Shanghai, Manilla, Yokohama) are nearer to New York via Panama than by Suez. Therefore much of the American Trade to the Far East is not

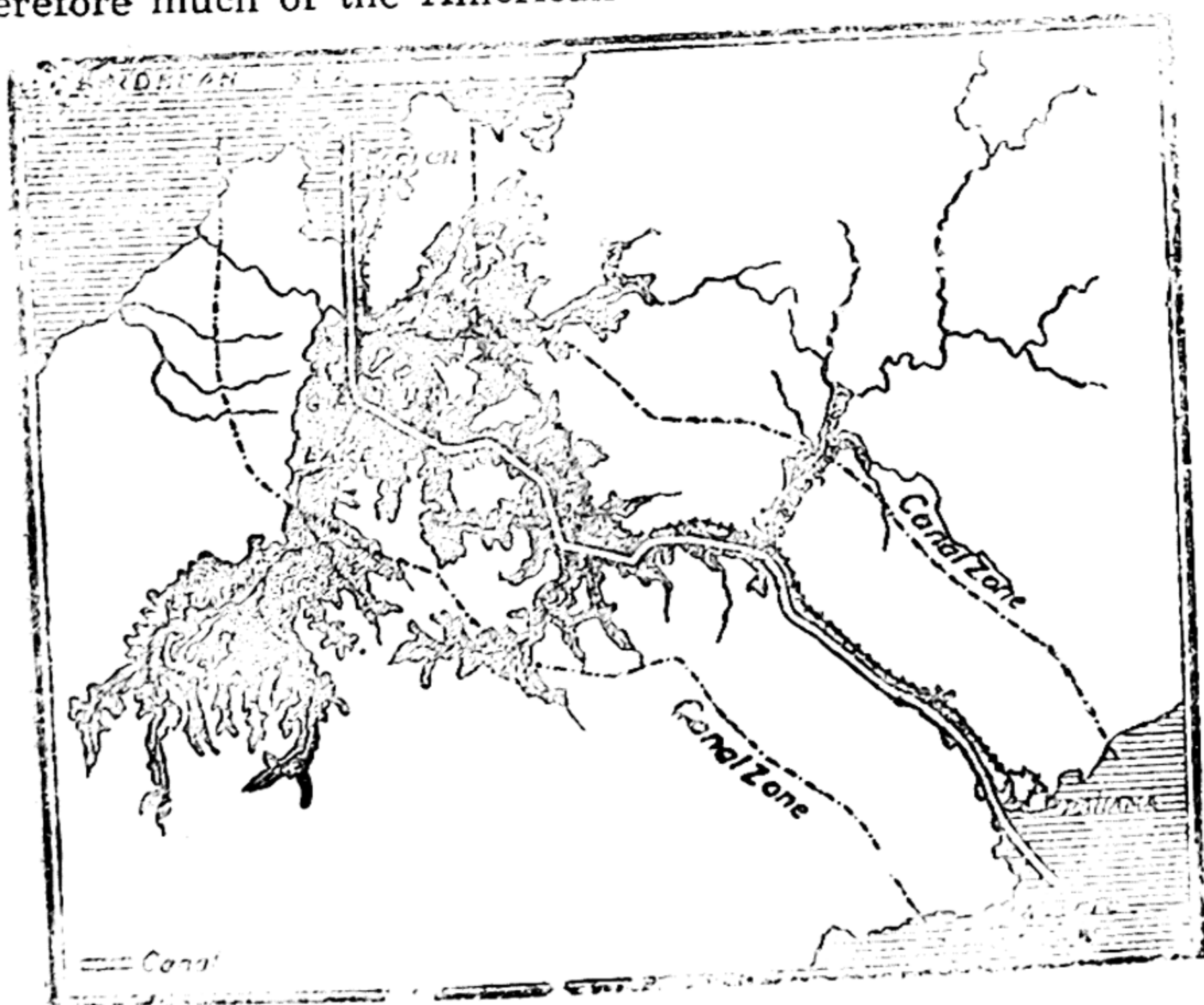


Fig. 33—Panama Canal

carried via Panama for American ships trading with India and Asiatic ports west of Hongkong will use the Suez route both because of the Lesser mileage and because of the greater trading facilities the Suez route offers.

4. The western sea board of N. America and South America is brought nearer to the parts of both Eastern America and western Europe. It has reduced the distance between the eastern and western coasts of North America by about 7000 miles. This is one of the greatest advantages of Panama since it has helped to develop the trade of the western states of South America. British Columbia exports grain, timber and other bulky commodities by a cheap "all water" route instead of by expensive transcontinental route as before.

As far as the U.S.A. is concerned the greatest advantage lies in the shortening of the sea route between her eastern and western coasts not only for trading purposes but for strategic reasons too. The ships of American navy can now be moved much more quickly from the Atlantic to the Pacific and vice versa as political needs demand.

The use of the Panama route has a beneficial effect on the West Indies which now lie on a great ocean highway instead of being as formerly the terminus of a sea route.

Thus it will be seen that the greatest advantage of this canal has been conferred upon the U.S.A. which is naturally the biggest user of this canal and hence the trade of U.S.A. has been promoted and the importance of Magellan is much reduced. About 50% of the total shipping through the canal is American and only 25% British. Most of the cargo that passes through this canal is destined for coastal trade of U.S.A. and as such the advantages of this canal are really monopolised by the U.S.A.

Trade that passes through the canal. By construction of the Panama canal the eastern and the western ports of America are now connected by a comparatively shorter sea route. New Zealand exports the animal products such as cheese, mutton, wool, butter and eggs; Japan exports silk, gutta-parcha and rubber goods. China exports to the western as well as the eastern parts of the U.S.A. the tea, and rice, Philippine Islands exports to U.S.A. tobacco, hemp, wheat, fish, timber from Vancouver; mineral products from the San Francisco are exported to eastern U.S.A. and Great Britain. The other commodities which are exported from the western parts of European countries or the Eastern parts of America are:

Silver from Bolivia; nitrate from Peru; Cinchona from Ecuador, timber from Colombia, while the trade that passes

from the Atlantic Ocean to the Pacific Ocean consists of sugarcane tobacco and bananas from West Indies, iron and steel goods from eastern coast of North America and European countries; oils from U.S.A. All these commodities are exported to the western coast of America, Australia, China and Japan, etc.

Before opening of the Panama canal it was often prophesied that the other trade routes would be seriously hit hard by this canal but this, however, has proved to be miscalculation. On the whole the trade has shifted but little. Some vessels now go from New York, for instance, via Panama to Australia, China, Japan, Burma and Malaya that previously went by Cape but they invariably return by the Indian Ocean and Suez route in order to obtain full cargoes. It is shown that Panama canal has shortened none of those routes. While the trade that passes through Panama canal bound from west is from European countries, and eastern coasts of Americas to the western coasts and New Zealand, Australia, Japan and China, etc., This canal as such does not interfere on the trade which is carried on by the Suez canal. China and Japan have increased their trade relation with U.S.A.; with great surprising rapidity after the opening of this canal.

In fact, the bulk of the trade of the Panama canal can be called "Coastal trade", i.e., it is concerned mainly with the exchange of goods between North and South America and between west and east coasts of North and South Americas respectively.⁴

The following table shows the traffic through the Panama Canal:—

Year	North-bound (Pacific to Atlantic)		South-bound (Atlantic to Pacific)	
	No. of Ships	Cargo	No. of Ships	Cargo
1930	3,065	20,780	3,348	9,883
1953	3,736	18,766	3,674	17,329

COMPARISON OF PANAMA AND SUEZ CANAL

1. The Panama canal is mainly a Pacific canal as it is of utmost importance to the countries of Pacific sea boards of North America by bringing them in a closer touch with the manufacturing countries of the Atlantic sea board. While Suez canal is essentially an Indian ocean canal.

2. The Suez canal route is supplied with coaling stations as there are plenty of islands and other ports of call, i.e., Suez canal route is situated with great ports serving rich and populous

⁴ A. J. Sargent, *Seaways of the Empire*, Ch. IV.

hinterlands. While the route from Panama across the Pacific to Australia suffers for want of enough islands and halting stations as ports of call except Tahiti. From Panama to Japan and China a call could easily be made off San Francisco, but there is no other. The Panama route to Asia and Australia takes vessels across great void tracks of waste ocean.

3. Coal is easily and cheaply available on the Suez route especially as the coal resources occurring at many places are served by this route, but the Panama route serves the regions deficient in coal though it is rich in mineral oil.

4. The Suez route serves some of the most thickly populated areas and carries therefore a much larger traffic in agriculture as well as manufactured articles than Panama route which generally serves poor mountainous or desert-like waste regions comprising west coast of North America or South America and hence very little traffic passes through the Panama canal route.

5. The Suez canal is longer, passes through a level plain and hence there has been no necessity of constructing locks as is the case with the Panama canal. Moreover, it is less deep than the Panama canal and the practice of 'typing up' so annoying in the case of Suez (as it is not wide enough to let two or more ships pass side by side at a time) is not necessary in the case of Panama canal as the latter is enough wide.

6. The Suez canal dues are much higher than those of the Panama canal, *e.g.*, the dues in case of Suez canal for loaded vessels are 5 s. 9 d. per ton (100 cu. ft.) and for vessels *ballast* it is 2 s. 10 d. per ton. While the dues for the Panama canal are one dollar per ton for the former and 40% less for the latter.

7. The tonnage passing through the Panama canal is normally about the same as that using the Suez canal, *viz.*, 30 m. tons approximately but where as over 50% of the vessels passing through the Suez canal are British about the same percentage using the Panama canal are U.S.A's vessels and of these the great majority are engaged in trade between the East and west coasts of North and South Americas.

OCEAN ROUTES

Ocean transport is the most important and the cheapest and the most satisfactory means of communication. The cost is solely in the construction and working the vessel. The road incurs no expense and is free to all. The fact that the long highways of the open ocean are supplied ready for the use and sometimes in the case of sailing ships, the motive power is fur-

nished by nature. Nature gives ocean transport a cheapness out of all proportion to land transport.

Oceans are no longer barriers as they were in the earlier days of the civilization. They are links between countries and more advanced the progress of any people the greater advantage do they take of the ocean highway. Those countries with a long and easily accessible seaboard are the more advantageously placed in developing trade. Sailing vessels nowadays generally carry cargoes which are cheap in proportion to their bulk and for which there is no immediate hurry. Grain, coal, timber, salt and ice are typical cargoes. Yet ocean transport is no novelty of the present age; it was well developed by Indians, Chinese, Phoenicians, Greeks, Carthaginians, Genoese and the Egyptians long before the beginning of the Christian era.

The sixteenth, seventeenth and eighteenth centuries—the times of Cabot, Drake, Hawkins, Tasman and Captain James Cook—were the great days of sailing ships. In the early part of the nineteenth century many changes took place in ocean craft and gradually ocean steamers came in use.

Ocean steamers are of two kinds, *viz.*, the Liner and the Tramps. The liner makes regular voyages between the chief ports of the world and carries in addition to passengers and mails manufactured goods of high value in proportion to their bulk. Many modern liners especially those engaged in the trans Atlantic trade, use oil instead of coal for fuel. These great ships are veritable floating places with from 6 to 10 decks, electric lifts, gymnasiums, bathing pools and luxurious lounges, and in addition to ordinary cabins they are also fitted with wireless telephones. The ordinary liners such as those engaged on the South African, Australian and Far Eastern Routes, though not planned on so magnificent a plan are extremely comfortable vessels.

In addition to passenger liners, there are cargo Liners. These vessels are fitted with cold storage chambers where a low temperature, maintained by means of refrigerating plants enables meat and other perishable food to travel without deteriorating. Other vessels designed for special purposes are tankers, liners, whaling ships and dredgers.

The ordinary tramp steamer does not ply on regular route, but goes everywhere in search of trade. Raw materials and relatively non-perishable and heavy commodities like wheat are usually carried by the trampers.

The age of sailing ship is past and at present less than 3% of the world's tonnage is composed of sailors. As sailing ships depend entirely on the wind for power, their overhead charges

are small compared with those of a steam or oil burning vessel. For example sailors carry nitrate and ores from Chilean ports timber from Br. Columbia and wheat from lesser Australian ports. While steamships being largely indifferent to wind and weather, take the shortest route from port to port only the worst weather seriously interferes with a full-powered modern steamship, calm and adverse winds do not detain them.

The larger the vessel, the greater the amount of goods that can be carried over seas. This reduces the freight of the cargo per ton. And since first it is costly to break bulk, i.e., transfer from one means of transit to another of the same or different kind, and, secondly sea transit is always cheaper than land, it pays to carry bulky cargoes occupying a whole vessel to the port nearest to their destination. Hence such commodities go to many small ports while the more valuable, less bulky commodities arrive in large vessels as parts of a general cargo at large ports.

Special kinds of steamers are built for particular cargoes, e.g., vessels fitted with tanks and with engine room in the stern are used to carry petroleum in bulk. Ore carriers are built with large patches and holds and various devices for speedy loading and unloading meat. Certain vessels are also used as icebreakers and their chief work is to keep open during winter the sea ports which would otherwise be closed by ice.

The following table gives the merchant shipping fleets in the thousand gross registered tons:—

Merchant Shipping

(In 000 'gross registered tons)

World and Selected Countries

Countries	1947	1954
World	178,705	97,422
Canada	1,870	1,610
U. S. A.	32,423	27,344
China	649	660
Hongkong	135	210
Japan	1,204 (1948)	3,578
Pakistan	—	170
India	58.5	112.9

Ocean routes can be traversed in all directions and they cover nearly three-fourths of the earth's surface, definite routes of travel have been established across them and beyond these

sea routes the vast expanses are completely deserted. Thus the routes by which goods are conveyed to their ultimate destination depends on several factors, which have naturally played their respective part in determining these trade routes. (1) The first principle of the ocean navigation is to take the shortest cut between two places as far as practicable. Owing to the spherical shape of the earth such a route is always the arc of a great circle, of which the centre of the earth is the inevitable centre. The earth as we know is spheroid. So where it is a north and south route the shortest cut lies along a meridian, but where the route is from east to west or the reverse, the shortest cut deviates from the parallels of the latitude in proportion to its distance from the equator; it is only on the equator that it lies along a parallel of latitude, i.e., along the equator itself. Since, these parallels are shorter and shorter towards the poles, the shortest of the east and west routes in the Northern Hemisphere deviate most and may curve towards the north from the parallel connecting places at the ends of the route; in the southern Hemisphere it deviates farthest towards the south. Thus the steamers, therefore, where possible follow the arc of a Great Circle. "Thus the shortest distance between any two ports is the route following the arc of Great Circle passing through them", e.g., in winter, ships from western European outward bound for north-east ports of North Americas follow the Great Circle route across the Atlantic from the British Isles to Newfoundland, where they diverge according to their destination. While in summer vessels bound for these north-eastern ports take a more southerly route than they do during rest of the year, for in these months there is a considerable danger from icebergs that float down from Greenland into warmer waters.

(2) But in practice the Great Circle route has to be modified by certain other considerations. There may be land in the way on a great circle route (shortest cut) and this may cause considerable deviation. So also does the climate of a region cause diviation from a great circle course. The circle route from Cape Town to Wellington lies to the south of Antarctic circle, but the actual passage of ships takes a more northerly route.

(3) Coaling stations, and oiling bases, again, oblige ocean going vessels to modify their routes sometimes, but these are situated along the great curve routes as far as practicable. The steamers must have coaling and oiling bases along its track and it is for this reason that many of the small Islands like Vincent in the Cape Verdes has palms on the Canaries or Perim in the Red Sea have considerable importance.

(4) The presence of ice also determines to a certain extent the route which a steamer will follow, e.g., during winter

when St. Lawrence is closed up by ice, the ships are diverted to the ports further south. Again though the Hudson Bay route is the shortest from England to Canada, the presence of ice for the greatest part of the year scares the ships away from that route.

(5) Ocean currents and prevailing winds are also important factors in determining the sea route, *e.g.*, most of the ships from Europe to Australia follow the Cape Horn route to avail themselves of the Westerlies from behind in their outward voyage. While on their homeward voyage they return by the Suez route to avoid facing these Westerlies which will reduce their speed or cause more coal to be burnt if the ship followed the outward route.

PRINCIPAL OCEAN ROUTES OF THE WORLD

1. The North Atlantic route.
2. Cape route.
3. Mediterranean Suez route.
4. Pacific ocean routes.

1. *The North Atlantic Route.* This route is the busiest and most travelled of the world's ocean routes as the routes through this link the world's two densely populated, highly developed and industrialized regions of the North West Europe and the Eastern U.S.A. It has been estimated that nearly half the shipping of the world is engaged here. The American end of this route has various termini. The greatest amount of shipping goes to the New England ports and to New York, Halifax, Philadelphia, St. Johns, Quebec, Boston, Baltimore, etc. But in the summer St. Lawrence route is open, and the main north Atlantic route lies farther north using the short Great circle route which passes north of Newfoundland while on the European coast are Southampton, Liverpool, London, Bristol, Amsterdam, Bordeaux, Glasgow, Lisbon, Manchester, etc. The territories on either side of the Atlantic are well supplied with coal and petroleum and hence steamers plying across the Atlantic have no difficulty with regard to the supply of fuel.

The great bulk of the trade is eastward bound and a large number of ports' commerce across the North Atlantic would not have been so facilitated and consists of timber, tobacco, wheat, woodpulp, meat and iron ore from Canada and U.S.A. Since both eastern North America and north-west Europe are manufacturing areas the trade in the manufactured goods is smaller than the trade in food and raw materials. The westward bound cargo is, therefore, less than that carried eastwards. Thus about three times more shipping space is needed to bring American cargoes to Europe than to carry Europe's goods to America. This

route carries most passengers than any other sea route, and it is served by the largest and most luxurious liners of America, England, France, Germany and Italy.

"In both variety and volume of cargo this route far exceeds any other, one-fifth of the shipping of the world being required to serve it.⁵

The trunk of this route is in the form of a broad northward curving and band running in a north-east-south-west direction roughly between latitudes 40° and 50° . The group of Atlantic shipping routes spreads out fanlike from Europe to the west Indies and Panama and to the Canaries whence there are two lines of trades—one south-westwards to south America (to Rio de Janeiro and Buenos Aires) and the other southwards to Cape Town. Another group of routes radiates from the New York region to the Mediterranean, S. Africa, eastern S. America and Panama.

A striking feature of Atlantic trade route is the absence of a counterpart to the Europe-America route in the southern hemisphere. Because temperate S. Africa and Argentina produce very much the same food products and raw materials, there is a better scope for interchange and trade. The trading associations of these two areas are with Europe and America where they can sell their surplus food-stuffs and raw materials and whence they can obtain manufactured foods.

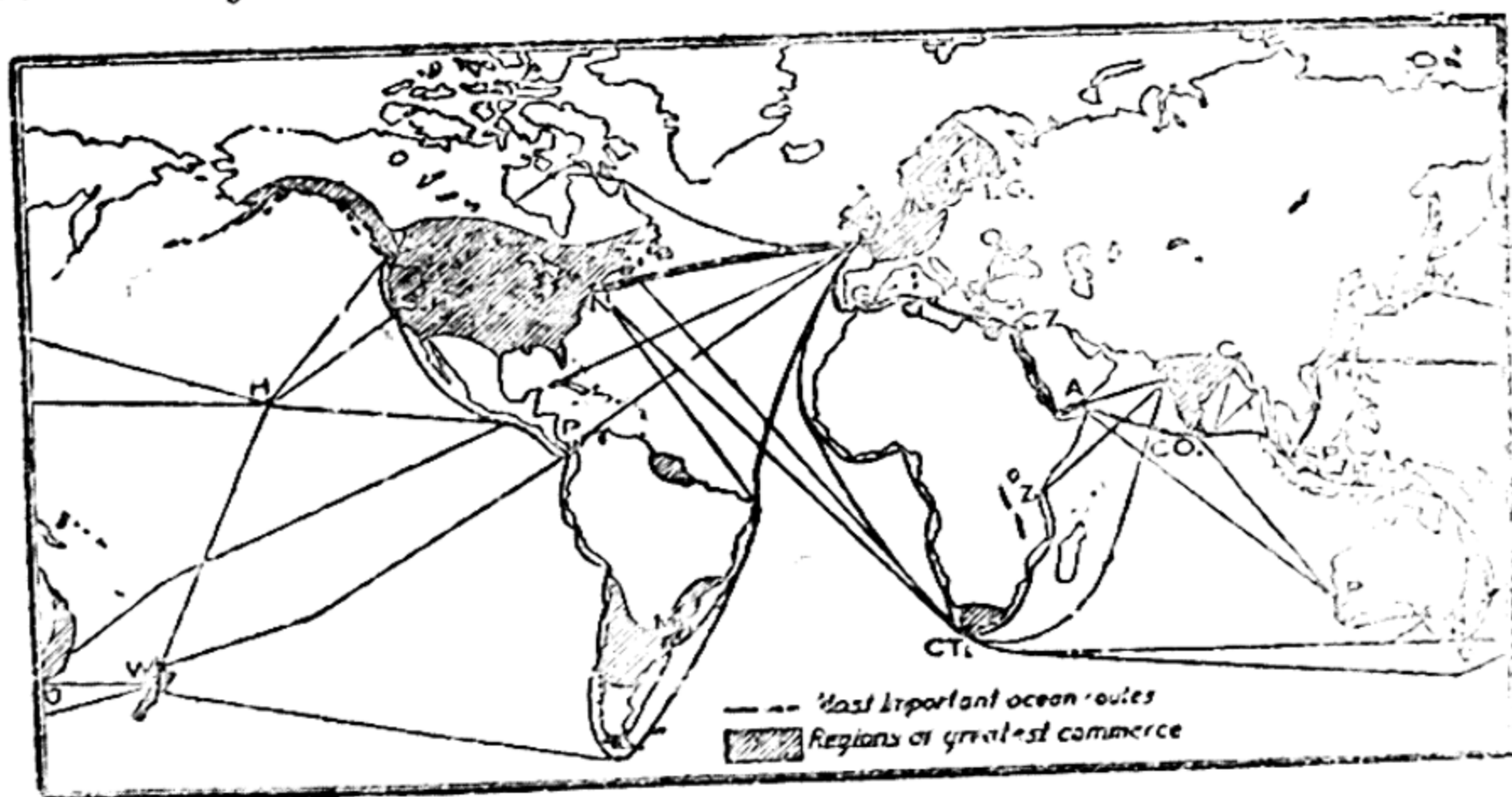


Fig. 34—Important Sea Routes

Cape Route. This route joins the western European countries, western and southern Africa. The chief ports on the European coasts are London, Cardiff, Liverpool, Southampton.

⁵ Finch and Trewartha, *Elements of Geography*, p. 756.

Swansea and Lisbon. This route from London calling at Madagagascar and the Canary Islands reaches the Cape Verde Islands. Here it is joined by another route coming from the Atlantic ports of U. S. A. It then proceeds to the Islands of Ascension and St. Helena and reaches Cape Town. Here, while main line goes direct to Australia and New Zealand, vessels trading with India and far east after calling at the S. Africa ports of port Elizabeth, East London, etc.; and at Mauritius steam north-east to Colombo. All the freight steamers from the U.S.A. and Europe use this route to Australia instead of the Suez route, due to heavy canal dues. Of the 15% of Britain's ocean tonnage engaged in the Australian Trade about 75% of the outward bound traffic and 50% of the homeward bound tonnage use the longer cape route in preference to shorter Suez route. Australia sends wool, gold, copper, tin, wheat, meat, fruits and exchanges for the European textiles, clothing, machinery and plants. The exports of South Africa are palm oil, ivory, gums, rubber, cabinet wood, hides and ostrich feathers. This route is chiefly served by Lion coastal line, Australian Commonwealth line and P & O line steamers.

Compared with the Suez route the cape route has the disadvantage of fewer ports of call, fuelling station at longer intervals and less favourable weather conditions.

3. *Mediterranean Suez Route.* The Mediterranean Asiatic route passes through the heart of the world, touches more lands and serves more people than any other route. It is the "life-line" that connects Britain with her raw materials, foodstuffs, and markets in India, Malaya, Australia and New Zealand. In 1940 its utility was jeopardised by the military and the naval action of the Axis powers, and Britain was forced to divert much shipping to the south African route and then to make extreme military exertion to lessen the threat of danger against the Suez canal. It has been calculated that with its many ports of call it reaches one way or another about $\frac{3}{4}$ of the total population of the globe. There are a number of refuelling stations, viz., Gibraltar, Malta, Port Said, Aden and Colombo so that ships cannot take up coal or oil frequently and thus carry more cargo. Practically all the European and the American traffic for India, East Indies, China and Japan passes through Suez. This route is well provided with fuelling deposits and is best for the stopping at intermediate ports of call. Because these ships can easily get coal it is possible for a vessel to adjust its bunkering space to suit the requirements for cargo space.

The outward traffic to Australia through Suez in principally that of passenger and mails, package and perishable goods and refrigerated cargoes of meat and fruit. The Suez tolls are

high and therefore cheaper fares make the cape route the most important for trading ships going out to Australia. These fuel at Cape Town and proceed to Australia.

From the Red Sea the route passes into the Indian Ocean. In the Indian Ocean one route runs due South along the African coast while the second the northern most line connects Aden with Karachi and Bombay and the third route crosses Colombo. From here the traffic divides along four different routes as follows:—

- (a) The Madras to Calcutta.
- (b) Direct to Rangoon.
- (c) Via Singapore to Chinese and Japanese route.
- (d) and to the Australian ports of Perth, Adelaide, Melbourne, Sydney, and Willington.

Ships returning from Australia follow three routes:—

1. Sailing ships proceed westwards across the south Pacific and backed by westerly winds reach Europe *via*., Cape Horn and the Atlantic Ocean such route is used by the annual race of grain-carrying sailing ships.

2. Some ships travel back from Australia *via* S. Africa. Then they take a route slightly more northerly than on the outward journey in order to avoid steaming in the teeth of Westerly winds. These ships usually use coal at Durban, where coal is cheaper than at Cape Town.

3. At least 50% of the homeward bound ships from Australia return *via* Suez.

The lands lying in the Mediterranean, Indian and Far Eastern section of this route provide on a vast scale and in a great variety bulky raw material and foodstuffs needed by the two great industrialised regions of North-West Europe and North-East U.S.A. So long as the highway of the Mediterranean Suez route the East sends its raw materials and food to Europe, receiving in return the manufactured articles of the western world. But as the purchasing power of the peoples bordering the route is comparatively low and hence the volume of their imports is less than that of their exports. Therefore, more shipping space is required for eastward bound traffic than for that going westward. The Suez canal aptly termed the Ditch is the chief modal point of the route and because of its liability to attack from land is the weak link in the chain of the world-wide trade.* This route is served by the Peninsular and Oriental

* R. Brown, *Principles of Economic Geography*, p. 170.

Steamship Navigation Co., Ltd., the British India Line, the Australia Commonwealth Line and Japan Rail Steamship Co., Ltd.

4. *Route of the Pacific Ocean.* The size of the Pacific is so great, the ports upon its borders are so widely distributed and the total volume of trade that moves across it relatively so small that avenues of steamship traffic are not so well developed on it as upon the Atlantic. Hence, the sea routes of the Pacific are of much more recent origin. The vast zones of the Equatorial calms, baffling winds off the north-west coast of South America, the terrific Westerly storms in the straits of Magellan, together with the fact that the lands surrounding the Pacific had little traffic to offer each other, help to account for the late development of Pacific routes which took place during the epoch of the steamship.

The amount of trade moving along the Pacific routes is far less than that in the Atlantic for the former routes connect a region of small population with one in which, although the population is large, the demands for foreign goods are small because the countries are commercially backward. There is a route from western-north America to China and Japan which is in some ways parallel to the North Atlantic route. Raw silk, tea, rice and works of oriental art and sugar from Hawaii are carried eastwards to America; the return cargo being mainly timber, manufactured goods, and in recent years food products also. This route is served by the P. and O. Steamship Line and the Japan Mail Steam Co., Ltd.

The difficulty across the Pacific is greater because of the longer distance involved, e.g., the Asian ports of Saigon, Shanghai, Honk Kong, Osaka and Yakohama are separated from Seattle, Vancouver and San Francisco by more than 3,000 miles.

An important feature of the Pacific routes is the use of the Panama, New Zealand route for fast passenger traffic from the east of U.S.A., and from Europe. As in the South Atlantic there is no really important east-west route in the south Pacific because all shipping routes skirt rather than cross the ocean and traffic flows in and out of the Pacific to the Atlantic and Indian Ocean rather than across it from one side to the other.

The Pacific Routes Converge on Four Main Points. (a) The north route from the Chinese port of Honk Kong and Shanghai via Yakohama to Vancouver.

(b) From Honk Kong and Shanghai via Honolulu to San Francisco and Panama.

(c) From Australia ports of Melbourne and Sydney or from Auckland via Honolulu to San Francisco and Vancouver.

(d) From Australian ports of Melbourne and Sydney *via* Auckland or Wellington to Panama and Western Europe.

AIR ROUTES

Aeroplanes may be said to be formidable rival of the railway. It has great advantage of speed and it entails less cost than the railway in the preparation of the road way. As in the case of ocean routes air routes are not rigidly confined or restricted. Yet for the sake of safety and ease of navigation air routes do follow rather closely certain ground marks such as rivers or cities. The first essential of the successful operation of air transport lies not in the air but on the physical configuration of the area over which they pass and also on the availability of the suitable landing ground. In mountainous, thickly forested and marshy districts it is difficult to built sites suitable for aerodromes and for emergency landings. Both desert areas and open seas present navigation problems difficult owing to absence of land marks.

The ideal position of an aerodrome is in open country within easy reach of large centres of population, for these provide prospective passengers, accommodation for travellers on long distance routes and cheap supplies of fuel. On long distance routes such as that from London to Capetown a number of aerodromes are of necessity situated in remote district on this route. There are suitable aerodromes and emergency landing grounds between Cairo and Khartoum, but beyond Khartoum there are stretches for 1200 miles a land of tropical swamps, lakes and rivers winding between marshy banks where papyrus and other reeds grow in luxuriant profusion. Many parts of this region are impassable by land at all times and the whole area is quite impassable during summer rains. At one time seaplanes were used between Khartoum and Kisumu on lake Victoria but now aerodromes have been constructed and aeroplanes are used all the way from Cairo to Cape Town.

Just as shipping is more at mercy of the climate than land transport so commercial flying is more susceptible to weather conditions than shipping. Air disturbances such as heavy rainfall or snow storms or ground fogs compel aeroplanes to make forced landings or to suspend flying operations temporarily.

Besides the physical factor wireless and meteorological service have to be inaugurated, e.g., in British Isles and North-West Europe fog presents a problem especially during the autumn and winter months. In spite of the instruction by wireless it is sometimes difficult to keep the regular routes. The visibility is poor or negligible and there is always the danger of aircraft colliding with wireless masts, pylons and other high structures.

The directions of the air routes is determined by the relief conditions of the earth over which they pass. The reason why airroutes do not pass over the mountainous regions is that the aeroplane can pass over the mountains of the medium size only. It is difficult for goods carrying crafts to rise over altitudes extending over 14,000'. This explains us as to why the most important trunk routes avoid higher mountains that come in this way. Moreover, in higher altitudes the air is less dense, it offers less resistance to the passage of air craft, it also exercises less lift upon it and the power of engine is reduced so that aeroplanes may be forced down under the weight of ice on the wings. These conditions when coupled with the heat of a tropical sun, lessen both the cruising speed and the lifting capacity. Thus, "Varying principally according to the type of machine, the load it is carrying and the state of atmospheric pressure, every machine has its maximum flying altitude higher than which it would be unsafe to fly." Air conditions over highland regions are often stormy and unstable and the risk of flying is greater in such regions than in lowland areas. It is for this reason that the air routes over Alps from Munich to Milan and that over the Rockies from Chicago to San Francisco both make every use of valley routes and gaps.

On long distant routes, many countries are traversed and in each case it is necessary to obtain permission from the authorities before flying over those countries. In some cases this permission is withheld; and in other many difficulties are placed in the way of foreign air craft. It is only by good will that such obstacles can be overcome.

As regards the capital expenditure it may be noted that no money is required for building or maintaining a route for the aeroplanes. Money is needed only to build the planes and halting stations. Transport costs under Air Transport are naturally lower than under rail transport. But the business done by the railways is much larger as aeroplanes do not carry bulky goods and hence ultimately the air transport proves to be more expensive than rail transport and as such it is used when saving in time is extremely needed at the expense of the high transit charges.

Moreover, the development of the air transport has caused the building of modern air ports at the outskirts of the towns in Europe and America. As said above air ports require large open spaces which are easily and cheaply available on the outskirts only. The development of the Transcontinental airlines has led to the building of air ports even in out of way areas, like the Arabian desert, which do not provide any traffic. Such airports, on the long journey, are necessary for the comfort of the passengers and for refuelling the planes.

Nothing hinders the development of the aerial transport more than disappointing passengers who wish to make an important journey but find themselves crowded out by the mail. If speed is wanted then load carrying ability must be sacrificed. If the craft is to be a great passenger carrier, then we must expect less speed and less manoeuvrability.

The aerial navigation got a great stimulus during the Great War of 1914 when aeroplanes were largely used as instruments of attack on the helpless people. Since the end of war there has been a rapid stride in this sort of transport, but still the mechanism of aerial navigation is not adequate and perfect and hence air transport is still considered to be in its infancy.

Air transport is the quickest form of transport but it is chiefly meant for carrying passengers and mails especially in the industrialized parts of the world. The greatest advantage of air transport is the very high speed at which the journey is performed saving a great time. From New York Liners cover the 2500 miles to Los Angeles. In regular air routes it is possible to travel from London to Paris in $1\frac{1}{4}$ hrs; to Delhi in 6 days; to Cape Town in 9 days and (via Paris and Dakar) to Riode Janeiro and Buenos Aires in 8 days and to Santiago in 9 days.

Dutch air lines fly from Amsterdam to Batavia 8,830 miles in 8 days; and French liners travel from Paris to Saigon 7,140 miles in $8\frac{1}{4}$ days.

Commercial aeroplanes only carry a limited supply of fuel, for otherwise their passenger and cargo space is limited and their earning capacity is decreased. On an average commercial planes travel as fast as trains and four times as fast as steamships. The average speed for a commercial aeroplane does not exceed 400 miles and thus on a commercial route a chain of aerodromes at regular intervals is essential for refuelling purposes.

The aeroplanes have been instrumental in the development of trades in such commodities which are fragile and perishable in their nature, e.g., mutton, beef, eggs, fresh fruits and butter and ladies millinery, hosiery, perfumery, drugs, cinematograph films, motor cycle and motor parts, musical instruments etc., which possess great value in small bulk so that the cost of transport by air may be borne. The countries which are likely to get the greater benefit of the air transport development are those which largely produce perishable goods like Denmark, Holland, New Zealand, Australia, Argentina, Switzerland, India and U.S.A., because these countries have specialized either in dairy farming poultry farming or fruit growing. Besides this Air travel offers businessmen a quick and comfortable means of

paying more frequent visits to branch offices and works and of keeping in close touch with agents and customers. The aerial flight saves a lot of time in transferring both man and business documents or a delivery of samples or consignments of goods.

Aerial navigation may mean greater and more severe internal and external competition for the industries. It has given a fillip to many industries. Thus the trade in cinema films has increased because these can be cheaply and easily transported from place to place and from country to country.

The chief reason for the development of the aerial navigation is not wholly commercial by this time. It is largely for the purpose of connecting the home countries with their colonies and for military purposes.

Besides, these, aeroplanes are also being used for combating with the malarial mosquitoes and the destruction of boll-weevil in the cotton fields of U.S.A., Canada has already employed the aeroplane in forest patrol for many years. Areas of land, hitherto unexplored can thus be surveyed and explored with a view to discover new minerals. This has been done in the crown colonies and Mandated Territories of British Empire in New Guinea and British Guiana. During the earthquake in Behar in 1934 a survey was made by means of aeroplane.

Autogiros. Aeroplanes without wings, ailerons, elevator or rudder can do a good deal by way of relief transport especially during the floods in India.

If civilian aviation can be a commercial success for goods traffic and mails carrying it would greatly increase the economic structure of the countries. First and foremost it will increase the boundaries of the markets by "shortening the world", by bringing the eastern outlying parts of the Empire much closer and nearer to one another by aerial communication.

Air transport is thus no longer the dangerous and haphazard thing which many still regard. It has come to take its place in the scheme of evolution which is unfolding so rapidly aided by modern science. It has immense advantages over other forms of transport. It has and will secure the maximum economy by elimination of time and space. The world owes a deep debt of gratitude to the pioneers in flying who had made air travel a practical possibility. To sum up, "By the use of air craft impenetrable forests, mighty desert and vast stretches of wild country are now crossed in hours instead of days, weeks or even months. Settlers over wide areas are supplied with letters, luxuries and medical assistance by aircraft in a way that would have been impossible by surface transport. Aeroplanes have their own

special part to play in world communications, and it is a part no other form of transport can adequately fill" (British Commercial Air-routes)."

IMPERIAL AIRWAYS

Apart from the continental airways in Europe, there are many great and spectacular world airways of special interest.

England to East and Australia is the most important Empire air route. It connects some of the most distant places of the British Empire with the home countries. Most significant fact about it is that it avoids the crossing of the sea as far as possible and over large areas its route is above deserts or dense forests.. In many cases therefore, the halts provided on this route are mostly to provide rest to the passengers and fuel to the plane route than to collect traffic.

This route is maintained by the Imperial Air Ways between England and Europe on the one hand and the far east on the other. This route is from London (Croydon) to Paris and thence to Marseilles following the Rhone Corridor and avoiding the high Alps. From Marseilles the aeroplanes fly to Athens and Alexandria a great air port and air junction, for at this point air routes diverge to east and south-east to Cape Town. From Alexandria the route goes east to Amman in Trans-jordania, and thence to Baghdad, and Basra, Bahrin, Sharjah. The slight northward detour to Baghdad avoids large stretches of Arabian desert.

From Basra the route avoids barren mountains of Iran (Persia) and follows the coast to Karachi. Thence, partly attracted by populous centres of Indo Gangetic plain, and avoiding Deccan plateau lands it proceeds via Jodhpur, Delhi Allahabad to Calcutta. The route then follows Burmese and Siamese coast to Rangoon from Rangoon the aeroplanes go to Bangkok (whence there are airroutes to South China and Japan) and thence via Penang to Singapore, following the coast of Malaya peninsula. From Singapore the Australian route follows the Chain of East Indian Islands via Batavia Keepang at the south west end of the Timor. The crossing of the stormy and shark infested Timor sea between Keepang and Port Darwin is unavoidable. From Darwin these are two important routes. One south and south east across the Australian lowlands to Brisbane, Sydney, Melbourne and Adelaide and the other along the north and west coasts of Australia to Perth.

Karachi and Calcutta are most important air stations on this route for traffic besides the terminal stations in London and Australia because India is economically the most developed part on this route.

The Dutch and French air lines follow more or less the British route as they have vested interests in the far east and the south.

England to Capetown. (a) This route starts from Southampton and crossing the Mediterranean seas goes to Alexandria, from where the route follows the Nile valley and African grass lands to Aswan, Khartoum and Entebbe (on Victoria). There is a bifurcation of routes at Khartoum. One goes westwards via Kano to Zanges and other proceeds eastwards to Nairobi and southwards, still following the grasslands to Broken Hill, Salisbury, Bulawayo, Johannesburg, Kimberly and Capetown. From Nairobi an alternative route follows Mombasa to Durban.

This route serves the British African colonial areas and avoids the great stretches of desert and forest land that would have to be crossed by a more westerly route.

(b) The French have established two air routes to Africa, one follows the western coast of Africa and goes as far as French Equatorial Africa *via* Bathhurst. The second route goes across the Sahara and the Congo and ends in Madagascar.

(c) The Italian air line goes by way of Tripoli and Cairo to Addis Ababa in Abyssinia.



Fig. 35—Important Air Routes

North-West Europe to Buenos Aires Air Route. This is the route over which there have been regular flights by the Great Zeppeline. The chief difficulty is the crossing of the south Atlantic and thence follow the Spanish coast to Gibraltar. After

leaving Gibraltar they follow the African coast to Dakar near Cape Verde in Senegal. From Dakar they take the shortest sea crossing to port Natal near cape San Roque in Brazil and then follow the South American coast to Riode Janeiro and Buenos Aires.

Dakar and other west African ports may become important as air bases if this south Atlantic route should be extended via Sudan lands to Egypt, thence to India and the far east.

Buenos Aires to New York. There are two important routes from Buenos Aires to New York (a) The first route follows the south American coast northwards to Port Natal, and then turning to north-west follows the coast of Brazil and the Guianas to Trinidad. The island festoon of the lesser Antilles provides the route to the larger West Indian islands, Haiti and Cuba. From Cuba the route goes to Florida and along the American east coast plain to New York.

(b) The second route from Buenos Aires to New York is more westerly. Aeroplanes first cross the Argentina lowlands westwards to Mendoza. Here they must await a signal that the weather conditions are suitable for the difficult crossing of the Andes via the Uspallata pass. From Valparaiso, the route follows the coast very closely to Panama and thence along the isthmus of Central America, Yucatan, Cuba, to Miami in Florida and thence along the eastern low lands of U.S.A. to New York

Airways between America and Asia. Air transport across the Pacific is maintained by U.S.A. aeroplanes. This route entails the crossing of vast stretches of ocean and so uses all the available islands. Therefore this route starts from San Francisco and goes to Canton via Hawaii, Midway Island, Wake and Guam to Manila in the Philippines. From Manila air routes diverge to various Eastern Asiatic Ports.

An alternative route and shorter because of its closer approximation to the 'great circle route' would be northwards along the N. American coast and the Aleutian islands and South westwards along the Asiatic coast. This route would however pass through the bad weather and gales of the westerly winds belt.

Western European to Eastern Asia. This air route between western Europe and Eastern Asia via Siberia follows closely the line of the trans-Siberian railway. From it a number of other routes are used for transport into these parts of Asia which have no railway and little road development.

U. S. A. Air Routes. The greatest development in air transport has taken place in U.S.A. Here there are several

trans-continental air lines. The amount of air traffic in U. S. A. exceeds the total of all other countries. The following table shows this. The chief airlines are the Limited airlines, American Air routes and trans-continental airlines which are connected with those of Canada and South America.

Civil Aviation: Scheduled Services (1954)
(In thousands)

Countries	Km. flown	Km. passenger	Ton Km. Cargo	Ton Km. Mail
U.S.A.	1,093,925	33,019,912	544,201	981,423
India	31,861	440,400	21,899	6,388
France	89,496	2,710,694	67,432	23,885
Pakistan	2,721	58,573	1,421	344
Indonesia	12,391	180,088	5,679	1,772
U. K.	93,413	2,438,740	51,790	20,072
Netherlands	52,179	1,362,118	44,412	8,772

U.S.A. is a country of long distances so that there are no political frontiers. The Atlantic and the Pacific coasts of the U.S.A. are among the most developed parts of the country and the quickest way to these areas is by air. The most important airports are Boston, New York and Washington, New Orleans, on the Atlantic coast and Seattle, San Francisco and the Los Angeles on the Pacific coast.

Roofy loves gqbal
Fancy " " Sajad. Karth
Tanveer " " Prince

CHAPTER 11

DEVELOPMENT OF CIVILIZATION

The story of human progress, both in space and time, is a process of man's adaptation to his geographical milieu. The underlying idea is that the earth is a grand stage upon which mankind is playing the drama of its social history. The earth furnishes not only a setting, but numerous hidden as well as obvious resources which constitute the warp of economic toil, interwoven in rich complexity of attitude with social traditions that form the woof of a seamless web, called human society.

In the process of social evolution, human societies pass through three fundamental stages of adaptation, viz.:

(i) *Etiological Stage*, where man is merely a creature of the environment and is adapting to its possibilities submits to his situation.

(ii) *Ecological Stage*, where man and region are not separate, but mutually inter dependent entities, and man's mastery of his environment is not a one sided transaction, but a value for value bargain; and

(iii) *Epharmological*, where man is an active agent of his environment rather dictates than surrenders, and so takes advantage of his physical resources as to modify his development in any desired direction.

Thus in his effort to dominate nature, by harnessing and exploiting the resources of the physical environment, man comes in direct conflict with the system of nature; and in this conflict lie the germs of progress. The greater the ascendancy of human culture, the fiercer becomes the conflict between man and nature; and the greater the intensity of conflict the quicker is the pace of human progress.

So to say the development of human culture is a product of man's reactions to environmental stimulus. The physical environment has played a large and very important part in the origin and development of culture, in that it supplied the material bases upon which every culture had to draw, and by supplying certain resource patterns and denying others, it offered to every people a series of opportunities for cultural development on divergent lines. It formed the essential foundation on which a large proportion of the discoveries and inventions of a people have been made; and with the material supplies, and the genius of the people have evolved most of the basic features of its culture. As the substructure of any civilization is the material fabric that frees mankind from the status of the

savage, therefore it follows that every civilization; the state of its tools and industries, the ability of its people and the organisation of society, in turn, must depend in large measure upon its geographical environment, i.e., (mountains, plateaux, plains, rivers, seas, soil, climate, vegetation and animal life).

We do not exactly know how the first steps towards civilization were taken. It is still a question of great speculation. Man emerged so slowly from the animal stage, that the specific beginning of culture cannot, however, be traced. Generally, mere chance or accident has played an important part in the creation of culture trait. Yet it is certain that in earliest drives of culture making, probably man's quest for food, shelter and reproduction must have been the first concern. Man could not have arrived at the human level of physical evolution without having a good knowledge about natural resources in food (fruits, roots, berries, fish and animals), shelter and safe sleeping places (trees and caves) and rudiments of language (modulations of voice, or natural expression of ideas and emotions through gestures). Later came the very earliest implements and weapons, e.g., sticks, stones, flints and bones, as they were found in nature. Advance in the technique of the utilization of resources were associated with other phases of culture, which developed language, art, morals, religion and government.

There, we found three marked stages in the evolution of culture. The three stages are savagery, barbarism, and civilization. In the stage of savagery man did not bother much except satisfying his primary physical wants. He ate, drank and wore and satisfied all other wants, that he found in his immediate neighbourhood. Hunting and collecting food were the main sources of livelihood. Progress in those days were judged from the quantity of food resources at hand, and clothing and shelter in general. Culturally they were backward. No symbols were used, though they developed the art of making rude stone picks, scrapers, knives and the wooden handles. They discovered the use of fire and the making of pottery and the bow, carving implements and the use of bones. Cultivation was unknown.

In the barbarism period, man to a certain degree freed himself from the yoke of savagery. He no more remained the obedient servant of nature. Through his ingenuity, he mastered the resources, plants and animals that were of his habitat. Primary food resources were not only considered as a mark of progress, even non-food materials were also to be taken into account. Certain degree of rest and comfort were the felt need of the people. Improvements in making stone tools by grinding and polishing; pottery and dwellings were made. Art of

weaving and plating, and of painting and decoration were the great achievements of this stage.

Lastly the stage of civilization was divided in two distinct periods (1) pre-Mechanical and (2) Mechanical. The main feature of the pre-Mechanical period was the development of agriculture, which gave rise to the permanent rural settlement. But then, the use of metals (bronze and iron) and the impetus of literacy gave rise to town economy. Modern civilization begins with the Bronze Age, in which, brick, masonry, bronze tools and ornaments architecture, walled towns, sculpture, the plough, the wheel, the chariot, domestication of horse, irrigation, sailing and art of writing all accompanied. Variety of metals came into vogue, which ousted stone and wooden implements. They were greatly used for the exploitation of natural resources. Many new resources which remained untouched so far, were tapped in which helped in the increase of wealth that gave way for economic prosperity and leisure. In the Iron Age the great progress was made in the use of iron. With it came road building, coinage, vehicles, crop rotation, fertilizers, architecture, commerce and the stable government. Religion and commerce were the main feature of this period, which reached the vertex of human development. Other great achievements of the period were arts and crafts, painting, music, sculpture, rituals, fashions, ceremonies, social organisation and political administration, which all mark the developed phase of civilization.

In the later period, the simple, systematical efficient language was evolved through which permanent records could be maintained. Here in this period we found the glimpses of the highest development of man's achievements. Untold devices both for the utilization of resources and for the development of material culture were employed. The story of human progress is of great wonder especially in this period. World-wide navigation, commercial enterprise, mechanical agriculture, power driven machinery, mass production, introduction of currency, banking and exchange are some of the developed phases of this age. His advancement in the field of scientific knowledge, invention of variety of instruments and appliances use of metallic and non-metallic minerals for dominating forces of nature, which makes him the master of his environmental situation. With the accumulation of knowledge the scope of man's social progress has broadened to the climax of imagination.

The development of civilization from the ancient primitive to the modern stage has been very slow and gradual. There, we found no uniform progress of social evolution among people of different racial talents and of dis-similar environments. The people of different races and places have given rise to their own

culture and civilization due to the three suggestive factors, i.e., a felt need of society, the proper physio-geographical base, and the requisite ability of the people for invention, at different periods. In the geographic interpretation of the history of human progress, there are four marked stages. (1) The fluvial stage of the alluvial river-valleys. (2) The Inland sea stage. (3) The Atlantic Stage, and (4) The Pacific stage.

The Fluvial Stage. Though there have been great controversies about the probable origin of the civilization, yet according to some scholars, Egypt, China and India are the accredited birthplace of civilization, from whence it spread over other parts of the world.

As a matter of fact early civilization required three conditions of its healing growth, i.e., a suitable climate; peace and security from internal as well as foreign aggressions, easy production and better means of transport facilities. According to these conditions, the tropical and the polar regions, because of their severe climates were not at all suitable for the development of civilization and so was also the cool-temperate zone due to its being less suitable on account of a harder struggle required by a man against nature. While the sub-tropical regions or roughly regions lying between: 25 and 50, stand prominently as the centres of early civilization. Thus in and around river valleys of the Rivers like the Ganges, Yangtze, Nile or Indus lay the place where the early people had lived as being most civilised as the river valleys provided the fertile soil, ample water supply, and easy means of transport by means of country-made boats, as well as the protection from the foreign aggression by means of lofty mountains, ranges in their background. Hence, all such river valleys were well-filled to afford man facilities, to evolve civilization and achieve great control over nature and over neighbours less fortunately situated in this respect. But as these methods of transport were primitive they prohibited any considerable intercourse with the neighbouring places with the result that early civilization in the fluvial stage was isolated one, no doubt it was a very high civilization.

So such river valley civilisation was achieved in very ancient times in China along the basin of Yangtse-Kiang, and Hwango. But as the Hwango was subjected to frequent floods, and as the river shifted its bed, these two thnigs led people to migrate and settle in the Yangtse Valley. Here the people not only carried agriculture but also developed commerce with the neighbouring countries. The westward movement from the western shores of the Pacific to the evolution of Hindu civilization on the banks of the Ganges, was an extremely slow process.

Bands of nomadic people wandering over the Northern region reached the Indus Valley, they spread all over the Punjab and also penetrated into the Ganges Valley. These people were herdsmen who kept flocks of cattle, but having found favourable conditions, also developed agriculture and settled down in the villages dotted over the banks of Ganges as well as the Indus. Then Hindu civilisation advanced here. From here also the advance was slow towards the plains of Mesopotamia and the Nile.

Mesopotamian plains, watered by Euphrates and Tigris, gave birth to Babylonian civilisation, where not only agricultural but industrial and commercial developments were also very great. At the same time a contemporary Assyrian civilisation also grew so much that it even absorbed the whole of Babylonia, but it was later overthrown, with the result that Babylonian civilisation reasserted itself. The prosperity of these valleys always attracted the hordes of invaders as did the Valleys of Indus and Ganges. But this civilization became moribund in course of time because of the increasing desiccation, neglect of irrigation and decay of its power. Owing to dense population, industries other than agriculture like weaving were also adopted. Here owing to the configuration of land, the population was more centralised than in Egypt, and land though much fertile, was subject to uncontrollable floods so that buildings were generally built on platform raised above the flood-level.

The Nile Valley concentration is known as one of the earliest centres of civilisation. As Egypt was in a way separated from other centres, its civilisation assumed a distinctive character, and left a marvellous record of its history, not only in inscriptions but in artistic products of the most perfect kind. The isolation of Egypt was not complete as intercourse between Babylonia, on the one hand, and with S. W. Europe on the other, was close enough to permit interchange of ideas, exchange of products and the development of a high order of civilisation.

The civilisations of China, India, Mesopotamia and Egypt are not only the most important from the point of view of ancient culture, but also because they have left lasting influence on the history and development of mankind. Being isolated in great part from one another, each river valley developed a distinctive civilisation, and achieved considerable progress before they were influenced by the outside powers. The high level which these civilisations attained is shown by the fact that many principles, ideas and ideals then evolved even now remain apparently identical with those of the present day.

The Inland Sea Stage. The net centre of human concentration besides the river valley was around the shores and numer-

ous islands of an inland sea. Between the Egyptian and the Mesopotamian centres there was inter-course by land, through the districts on the shores of the Levant, and the *Phoenecians* revived an impetus and led the way to second stage of development the inland sea stage.

The Mediterranean Sea owed its early cultural development to the fact that its shore received sufficient rainfall for most of the year enabling its inhabitants to carry on agriculture on the fertile soil, owing to the mountainous nature of the greater part of the land, the rivers are swift flowing and hence the debris was liable to be washed away but new methods of making terraces on the hill slopes were evolved for the agriculture, besides providing the water route to east as well as the west and as the majority of the countries lying on its shore had indented coast land had much developed trade. All these causes led to the early concentration of the human life. The Phoenecians navigated the Mediterranean and went so far as England.

Later on, Greece also developed civilisation, under the city states of Athens and Sparta all progress and power of which give it supremacy and leadership of the world. Meanwhile there had also sprung up the civilisation of high order among the people of Persia, and this resulted in a conflict with Greece, with the result that Greece had a control, over Persian civilisation. Greece had now been so powerful as to establish colonies in little islands and coasts of the Mediterranean and even on the Black Sea coast. It was here that Alexander the Great, had welded the Mediterranean countries into one vast empire. He had also attacked India, and western Asia and also amalgamated these too in his empire. The culture of the Mediterranean spread through Greece to the then-known world, and Hellenic or Greek influence permeated the whole current of life and thought in the East, even as far as China, and Japan.

Then Greece enjoyed this civilisation for a long time till a commercial civilisation of the Phoenecians and Carthagians developed on the African shores. These civilisations succeeded in having their influence along the northern shores of Africa and the Spanish peninsula. Meanwhile a new power was rising in Rome on the banks of river Tiber under the Romans. Rome had thus been a rival to the civilisation of the Phoenecians and the Carthagians. Anyhow after long struggle Rome wrested the premier place from Greece and Carthage and thus became one of the leading civilised nations of the then known world. Rome had remained centre for high civilisation and culture for many centuries. Spain, France, Britain and even the countries of Western Asia, Southern Europe and Northern Africa came un-

der her flag. It were the Romans who gave world the highly developed art of road-making, a sound system of jurisprudence, and a fine system of government of the vast Empire. It was due to the central position of Italy in the Mediterranean that Roman Empire held the important position of predominant world power for a long period.

The desert lands of Arabia were now affected by the march of civilisation, and the followers of Mohammad spread rapidly towards the northern shore of Africa and the Plateau of Persia, and the Steppeland of Turan, so that when the Roman Empire declined, fell and disintegrated, Islamic culture represented the standard of light and learning. The Crusades, the intrusions of Changhiz Khan and Tamerlane represented the struggles of the East with the occupation of Spain by the Moors, Islam had reached its western-most limits.

During the Dark and Middle Ages the Italian sea-towns had carried on the trade between the rich East and the progressive West, Venice had business intercourse with Syria and Greece; Genoa and Pisa in Asia minor and the Black and Caspian Seas. Trans-Alpine lands were thrown open with the penetration of trade routes from Milan and Turin across the Alps. With the dawn of the age of Exploration, the Mediterranean gradually declined in importance and power giving place to the western countries. Consequently western ports rose rapidly into prominence.

Besides the Mediterranean Sea, other inland seas like the Baltic had also witnessed a similar progress. The countries bordering Baltic became centres of power and light with the consequence that Denmark became the most important kingdom in northern Europe. But the commencement of the third stage of civilisation that of the Atlantic the Hanseatic League, and the rise of Flanders contributed the decline of the Baltic civilisation.

Similarly in North America, the Gulf of Mexico give rise to a remarkable civilisation, in its islands and the peninsula of Yucatan. The Mayas were great Pyramid builders. Though they were backward in several respects yet their calendars and hieroglyphic writing shows that they were civilised.

The Atlantic Stage. With the growth of the civilisation of the Atlantic shores, Spain rose to power and was further stimulated by the riches of Americas. Sea power, colonial expansion and commercial development became the objectives in the new age, and western European Countries found themselves in a central position bordering in the Atlantic ocean. Oceans now became great highways of commerce. The tendency of the Atlantic peoples to circulate from one part of the seaboard to another

may be attributed to various causes the chief being that a hardy sea coast race has a natural desire to adventure forth on the high seas, and that in this case there existed every incentive to seafaring. Thus a broken and rock coast makes internal communication difficult, as in Norway, or the bareness of the soil makes an extended occupation necessary, as in New England; or, again, a considerable increase in number produces too great congestion in one part, as in Holland. Often the people are helped to decisive action by special causes, such as the presence of abundant timber for ship building, as in Norway; the quantities of fish available near at hand as off Newfoundland; the spirit of curiosity and adventure including England. The result of maritime enterprise in the Atlantic shore-dwellers was to open up for them more habitable regions. As early as the 18th century, the hardy Norsemen swept the seas, settling in more convenient creeks, estuaries and islands along and around the coast of England, Scotland, Ireland, Normandy even traversing the Mediterranean to Sicily and Constantinople.

The age of maritime enterprise soon accelerated greatly the development of the Atlantic seaboard. The flame of civilisation affected France and Great Britain also, as a result of which France attained the height of her power under Louis XIV, and Britain soon became the centre of the land hemisphere, and wresting the carrying trade of the world from Netherlands, embarked on a contest for world power with France. Britain also built a huge colonial empire based on commerce, which from being local and continental now became world wide and international. The mechanical inventions towards the close of the 19th century secured to Britain the first place in industries, transport, and trade. Spain and Portugal had also developed colonial areas in North and South Americas.

The Pacific Stage. The present century has seen the lead passing to the other shores of the Atlantic so that while Europe remains a highly civilised and powerful land, America has also acquired increased importance which has been occupying a front place in the world's counsel. The civilisation of this country (U.S.A.) has been of high order due to big industries, inventions and labour-saving devices.

After so much analysis of the ancient and modern civilisations we are led to think that how the material culture of the disdainful present has ascended over the spiritual culture of the glorious past. The fact that in many parts of the world there exist remains of civilizations, which have long since passed away, is one which cannot fail to be recognised. There are records and remains of Egypt and Babylon, of Greece and Rome, of India and China, and several other glorious culture areas all over

the earth. These civilizations have decayed and disappeared. There are no evidences of the golden epochs, when man was thought to have been more clever and better than to-day; for like individuals 'Nations have their day'. A more plausible explanation is that the history of human progress is as much one of progressive rise, as one of progressive decline. If nature rears and nourishes man in her lap, she also frowns upon him at times and brings destruction and ruin. Since the foundation of all civilizations lie deep in the roots of nature, their survival and continuity are ensured so long as man works in harmony with his environmental set up. The decay and destruction of civilizations, in the long run, must be attributed to three causes: (1) inadequate manipulation of resource potential, (2) indiscreet utilization of available resources or (3) indiscriminate exploitation of resource areas, resulting in colossal waste. In support of this conviction ample facts are before us. The decline of Chinese civilization has been explained in terms of soil erosion, Greek civilization decayed due to inadequate resources, the fall of Rome can be explained with the declining rainfall and indiscreet manipulation of resources, the downfall of Indus Valley civilization is mainly attributed to the combined effect of the shifting of the river bed, decrease of rainfall, encroachments of the Thar desert, impoverishment of the soil, and lastly an indiscriminate exploitation of the vegetable resources leading inevitably to the impoverishment of faunal forms. Social progress thus, no doubt, comes with the evolution of culture complexes but it stays only so long as natural resources permit the effective mobilization of potential economic strength.

Civilisation, then, far from being a static concept, is a dynamic system. It is a process of culture accumulation and diffusion. It does not emerge abruptly, something out of the substrate left behind by successive streams of human race. Each new civilization accommodates and assimilates the old traits, and invents the new. If the civilization uses greater Natural Resources, its cultural pattern becomes complex, which in turn widens its scope and diffusion. But history tells us that no civilization has ever become universal. Since each civilization is composed of endemic culture traits, and available resources of the habitat, it essentially is suited to the progress of the people in the similar habitats. Regions with different environments themselves became distinct culture-areas, and after absorbing certain traits of other cultures, tend to evolve characteristically new civilizations. This is clear from the fact that in spite of centuries of give and take and culture contact, the East is East and the West is West. The former essentially remains spiritual and the latter largely material. Moreover no civilization dies altogether, it lies dormant till reconstructed.

CHAPTER 12

ESTABLISHMENTS

The two most fundamental requirements of human beings are food and shelter, and much of the imprint left by people upon areas that they occupy results from activities associated with those two requirements. Therefore, wherever he lives, man and his family must find shelter. He needs protection from excessive heat and cold, wind and rain and from ^{inexorable} ~~dire~~ attack of animals. And since nobody can escape sleep all human beings are compelled to seek shelter both from enemies and from animals. The entire range of varied dwellings from the cave of primitive man to a New York skyscraper or from a primitive wind break to an elaborate palace, is an expression of this primary need for protection and shelter. All types of dwellings in this varied range show that the factors influencing their erection have been many and almost as varied and complex as the types of dwellings themselves. The house, then, becomes a universal feature of regions permanently occupied by human beings and is one of the most fundamental elements of cultural geography.

The three main factors are economic, environmental and social. The first, which represents man's riches, or his poverty, is often the most important influence on his dwelling, whether it be remote farm house or crowded city street. The second factor of environment, which embraces the climate a man lives in, and the materials he has to hand, must also influence the house he builds. The third factor, the social, affects man in all stages of his culture. A clear proof of this may be seen in the club houses and ceremonial buildings of the primitive and the town halls, factories and schools of the more advanced civilization.

The term house includes not only the dwelling houses ranging from the humblest native tropical huts to the most elaborate city mansion but all other human structures as well, where people congregate or where their goods are stored. In primitive societies dwelling houses greatly predominate, but in more advanced civilization there is much variety of buildings, such as storage structure for crops, and foods, shelters for domestic animals and machines and numerous other types having industrial, commercial, transportational pleasure and religious functions.

The building structures are made of different building materials, earth, stone, steel and wood, houses are differentiated from one another not only according to the building materials but also other items as well like size, shape, colours, spacing and functions. Sometimes it is one feature of a region's build-

ings that give distinctiveness to the groups; sometimes it is another, e.g., in Norway, the bright colours of the houses are particularly striking. In Northern Russia the carved gables, gayly painted are a distinctive feature. The white stucco wall and red-tile roofs of the newer houses and the wooden bungalows are both typical of south California. Japan's houses are distinctive by reason of their close spacing, flimsy wooden construction, and heavy thatched or grey-tile roofs. The Chinese houses made of brick possess individuality because of its form being characteristically built around a court.

The houses are built from various materials available at hand. In primitive societies, there is a strong tendency to use those materials readily available at hand furnished by nature, provided, of course, they are suited to the prevailing climatic conditions. Igloos or the snow huts of the Eskimos; tents and yurts, made of felted hair and wool from their flocks and herds, used by nomadic peoples of dry interior and western Asia; the thatched frame and wattle huts of peoples in the tropical rain-forest or the abode dwellings of village peoples in dry lands are the important instances. In our country too, village houses are built of mud, and stone and thatched with dry grass and straws or locally built tiles or Kelus.

Burnhes points out that in travelling from north to south in European Russia, where a succession of natural zones is crossed, one is struck by the regular succession of dwelling types. Thus, in Tundra, where the trees and cultivated crops are absent and where human life is nomadic there are no fixed habitations, the summer dwellings of the natives being light tents made of reindeer skins, while in winter covered earthen pits serve as houses. To south of the Tundras is the wide belt of forests coniferous and deciduous—and within that natural region the wooden house is the prevailing type. Wooden dwelling is also common to many other forested regions such as Sweden, Bohemia, the Alps, Eastern United States and Japan. In its simplest form it is constructed of the straight trunks of the trees, notched at the corners and laid on top of the other. In more advanced societies the logs are first sawed into boards, and these are used for sheathing a wooden skeleton or framework. For roofing material, shingles, bark or thatch are common. Still farther south in Russia where forests give way to Prairie, the wooden house becomes much less frequent and sod and abode dwellings roofed with thatch or pieces of turf are the prevailing type. Simple sod structure are even now common on the American Prairies and the Argentinian Pampas.

In more advanced and complex societies, where transportation is better developed the dependence on the local materials

is lessened. As a result, there is likely to be a greater variety of house types. Whatever makes for variety of landscape, whatever makes it easier to foregather, has its influences on the distribution of establishments. In the mountains, slopes of moraines and alluvial fans are favourite sites for hamlets or villages. Along lake shores, lines of dunes are skirted by buildings upon their slopes. In the river plains of France, the terraces which were banks of ancient streams are adorned with houses or villages. Isolated hillocks in the swampy regions or Polders of Prussia were the sites of the earliest establishments. In Finland, stony ridges between clayey depressions have a magnetic attraction.

The utilisation of earth for building purposes can be best observed in Indian villages and in Africa. Among the Shilluk on the Upper Nile only roof and stockade are made of thatch, the circular hut being of the earth. Even in the backward country of Togoland extensive fortifications with bastions of hardened earth, connected by curtains of the same material, are covered with conical roofs which alone are made of leaves or straws. In the Indian villages the house walls are made of mud or sun-baked bricks, while the roof is thatched with straw or wood and kolhus. Sand indurated and cemented by infiltration, the compact alluvial land of Egypt and Mesopotamia, the clayey soil of Armenian plateau of Iran—even of Europe and Central China—vast lands lying waste of Steppe soils with their myriads of calcarious concretions, all of these have been in the one form or another made use of by human establishments. In Japan, the houses are made of wood and paper which are indestructible because of their resinous contents. The average Japanese house resembles a wooden cage placed upon the ground.

The grouping and arrangement of the buildings into colonization or occupance units are called the settlements. By human settlement we understand a colony of human beings together with the buildings in which they reside or otherwise use with their paths and streets. *compacted* Constrained by common needs, groups have been formed. The sinking and upkeep of wells, ponds and pools and the necessity of building walls, is a contributing cause to the crowding and concentration of living quarters.

There are three kinds of establishments that is: (i) Temporary and Permanent; (ii) The isolated or dispersed type, or (iii) Agglomerated or compact type.

(i) *Temporary or Permanent Establishments.* Man's foremost need is food. He lives therefore where he can obtain his livelihood. The farmer lives on the land on which he produces his food, the fisherman lives on the sea shore; the factory la-

bourer lives as near as possible to the factory in which he works. In these cases the man's dwellings are permanent because their means of livelihood is a fixed factor. The work of a coal miner, for example, always remains where it is because it depends upon a vein of coal being gradually worked from a fixed pithead. In the economic sense he is sedentary, because his work is stationary, when he obtains a dwelling it will be a permanent one as near as possible to the pithead. If a thousand miners work in one mine, there will be large number of crowded houses, together with the dwellings of those who serve the community; such as shopkeepers and public officials; the whole forming a typical mining village. The dwellings are permanent because the source of employment, the means of earning a living is fixed.)

(On the other hand, this is not always the case. There are people who are constantly moving for the simple reason that their means of sustenance is not fixed. The Bedouin Arabs of Northern Arabia, Khirgiz of Central Steppes, or the Eskimos of the Arctic zone are such people. The Bedouin are camel breeders, while the Khirgiz are cattle herders whose whole existence is centred around their animals; their movements depend on the necessity of finding pasture for their animals. Therefore tent is more suited to the nomadic life as it can be easily set up and pitched with the quick nomadic movements.

(ii) *Isolated or Dispersed Establishments.* In the isolated type the single residence unit is the chief characteristic as it is in the U.S.A., or Canada regions, or in the hilly places of Brazil, South Africa, or the South Eastern Rajasthan or in the Assam Himalayas. It is also characteristic of Argentina Pampa, Australia, certain parts of Europe as Brittany; the Po valley, Norway, and the mountainous parts of the Balkan Peninsula and of other parts of the world like the highland regions of Mexico, Southern Portugal, Western France, highlands of Central Europe, Northern Japan, Northern Manchuria and East African highlands. In all Europe, Norway is the best representative of the separate farmstead type of settlements; villages are almost exclusively fishing and trading centres.

The reasons of dispersed settlements in different regions are different. Thus in more recently settled areas such as U.S.A., Canada, Australia, Argentina, the abundance of cheap land resulting in large holdings has probably been the chief factor fostering separate farmsteads. Here the houses are far away from one another and this results in much loss of time and energy in going back and forth between residence and fields,

(In the longer settled regions like parts of Europe and Asia,

no single cause is so conspicuous. The dispersed settlement seems to be more typical of rugged and dissected regions. In fact, isolated farmsteads are more characteristic of hilly land, and compact rural villages reach their maximum development on plains.) Vidal de la Blache writes, "The scattered manner of grouping suits localities where as a result of the dissection of relief, soil and hydrography, the arable land is itself divided up. The clustered village is indigenous, on the other hand in districts where the arable area is continuous, admitting of uniform and expensive exploitation." (In regions of dissection and abundant slopes, the scattered fragments of cultivable land are often too small to support more than a few isolated farmsteads. The inhabitants are compelled to utilise other resources such as pastures and woodlands, which in turn require larger landholdings. Certain other factors like scarcity of water, marshes, forests, stony moraines and poor soils restrict the amount of contiguous arable land and this in turn favours the dispersed settlement.)

(The scattered type of settlement is found in France in different forms. Sometimes it is small isolated farm almost hidden by trees, connected with other farms a few hundred yards distant, by shady muddy paths. This is a frequent type in Brittany and Western France.) Elsewhere in the continent, two or three farms form the unit—somewhat crowded hamlets consisting of a dozen firesides or so is a frequent type in much of the Central Massif. Isolated houses are tiny foci incapable of exerting any attraction comparable to that which centralises cultivated fields about the clustered villages on great plains. Here everything spells isolation and privacy. (In Germany and Finland there appears to be some relation between areas of poor soil and dispersion.)

Nowhere in Europe is this scattered type of occupation shown on a large scale, nowhere has it more markedly archaic character than in the Balkan peninsula. (Scattered settlement and clustered hamlet type and village type, these actually seem to correspond to geographical differences. In Serbia, as well as in Bulgaria, the rugged and mountainous sections seem the natural habitat of the scattered settlement-slopes) and declivities rather than plains and valleys.

((iii) *Agglomerated or Compact Settlements.* Agglomerated or compact settlements are the collection of several or many residences together with other types of buildings.) Agglomerated settlements are designated by various names according to their size and complexity of their functions, i.e., villages, towns and cities. (As soon as the houses become grouped at different places the necessity for intercommunication between them is

urgently felt with the result that more or less defined streets become necessary, and the spaces between the buildings become relatively regular. Each agglomerated settlement becomes a focus of transport lines, for the important functions of towns and cities is their market services. In fact highways (roads, canals, rivers, railroads, steamship and air lines) together with the things that flow over them—human beings as well as goods—have very likely created a majority of the towns and the cities now in existence. Compact settlements are of two types:—

(1) Those which are essentially rural in aspect and functions. They include the rural village, the residents of which are chiefly tillers of the soil. Such a settlement primarily is concerned with the production of agricultural goods, both food stuffs and raw materials.

(2) Those the functions of which are non-agricultural or urban, which includes towns and cities, the inhabitants of which have "no immediate interest in the production of materials for their food or clothing but are engaged in transporting, manufacturing, buying, and selling these materials or in educating the people or in managing the affairs of the state or in merely living in town." (*Aurousseau*).

Urban settlements, because of lack of sufficient space are, closely built up, so that there is a denser population per unit area than in the rural village.

Rural village settlement is the commonest form over large parts of the earth, farm steads, instead of being isolated as in U.S.A. are grouped together in compact communities with farm dwellings and associated buildings and the predominant population is of farmers, though artisans and tradesmen may exist in minority.

In certain parts rural settlements differ from the typical farm village. In rubber plantations of tropical S.E. Asia or the *fazandas* of Brazil or sugar estates of Cuba, large number of hired labourers are employed. Plantations are like the factories organised to produce commercially a particular crop, having pretentious houses of the owner, modest huts of the labourers and in addition a school, a church and a hospital, such settlement usually lacks the permanency and close social bonds characteristic of the genuine agricultural village. Such settlements are not composed of a group of independent men, owning and cultivating their own homes and land. At present in U.S.A. the farm villages are rare exceptions within the standard pattern of isolated farmsteads. A small settlement of few inhabitants is likely to be composed of shopkeepers and artisans, etc., American villages as regards functions are urban and not rural.

The compact farm village is the basic and fundamental unit of settlement in East and South East Asia, Latin America and Africa. In these regions the basis of civilization is the village community. The village has few shops and those that exist carry a limited supply of goods. Trading is done chiefly at the market towns. In India there are about 6 lakh villages and 78% of them have a population below five hundred. Europe shows a complicated intermingling of the dispersed and agglomerated types, with U.S.S.R. being the largest contiguous area where the village type strongly prevails. In some what less dominant form it is also characteristic of Mediterranean, central and north-western Europe. Aboriginal settlements in the Arctic plains of North America are chiefly agglomerated.

Market Towns. Market towns are the smallest unit in which non-agricultural interests predominate. It acts as a trading centre for the rural settlement units, agricultural villages or isolated farmsteads. It has a distinctive business or a commercial nucleus.

In the agricultural village composition is relatively uniform throughout. The settlement is usually composed of farm houses and associated shelter and storage sheds. There does not exist any 'business section', although often scattered shops may be found. In the market towns, where urban functions are met with distinct and specialised functional areas are developed. In market towns are found the 'Commercial Core' or the business district; and the 'Residential Core'. In the former shops and stores are concentrated. Manufacturing units, government offices, schools and hospitals, cinemas, etc., are also located in the market towns but these are not segregated into distinct areas of conspicuous size. Usually in all towns, the 'Commercial Core' lies in the centre of the town with residential areas surrounding it on all sides. Thus villages have no distinct nucleus but it becomes the chief feature of cities and towns. In the 'Commercial Core' the buildings are often made nearer one another, while residences are usually farther apart.

Cities are plural, functional and perform market services as well as manufacturing, political and cultural and are expensive hence buildings are tall instead of being broad. Traffic is congested. Industrial areas are dirty and unattractive and represent great extremes of poverty and luxury. Thus in cities and towns inhabitants have no immediate interest in the production of the materials of their food and clothing, but engaged in transportation, manufacturing, trading and managing affairs of the State, while in rural villages they are chiefly tillers of the soil.

CHAPTER 13

ORIGIN AND GROWTH OF CITIES AND PORTS

"A city is a social organisation of much greater scope than the village; it is the expression of a stage of civilization which certain localities have not reached, and to which they may perhaps never of themselves attain".¹

Cities are in a way the spear-point of economic geography. They usually increase in population more rapidly than their hinterlands, and they are the places where new phases of economic geography develop most frequently. The forests of the Congo, the Amazon, the deserts of Gobi and Sahara, and the icy wastes of Greenland and the Antarctica all remain about the same century after century. But the greatest cities on the other hand, are being remade in almost every generation.

Cities are primarily important as centres of trade and industry, but they are also important as centres of government, finance, residence, education, etc.² The commercial city is like a giant sitting at the gateway of his estate—with one hand he sweeps up the products which the people of his hinterland prepare: with the other he reaches far out to other people—strangers perhaps, and offers his own people's products in exchange for something which he can send back to his subjects.... where—as the industrial centre resembles another kind of giant.... one who works with his hands to make machinery, cloth, chemicals, furniture and other goods in a great profusion of kinds. He, too engages in commerce, exchanging his manufactured goods for food and fuel and for raw materials that he must have if he would keep busy".³

Classification of Urban Groups

Class I Administration	Class II Defence	Class III Culture	Class IV Production (Manufacture)
1. Capital Cities	1. Fortress Cities	1. University Towns 2. Cathedral "	1. Manufacturing Cities
2. Revenue Cities	2. Garrison Towns	3. Art Centres 4. Pilgrimage "	2. Craft Towns
	3. Naval Bases	5. Religions "	

¹ Vidal, *Principles of Human Geography*, p. 471.

² According to Aourousseau, cities and towns have been classified according to their dominant functions.

³ E. Huntington, *Principles of Economic Geography*, p. 613.

Class V Communication		Class VI Recreation	
Group A Collection	Group B Transfer	Group C Distribution	
Mining Towns	Market Towns	Export cities	1. Health Resorts
Fishing „	Fallline „	Import „	2. Tourist Resorts
Forests „	Break of bulk Towns	Supply „	3. Holiday Resorts
Departments Towns	Bridgehead Towns		
	Tidal Limit Towns		
	Navigation head Towns		

(Quoted by Finch and Trewartha, p. 659).

All cities are partly industrial and partly commercial but the relative importance of these two types of activity varies greatly from city to city.

The factors that give rise to the trade centres are of general character as well as geographical.

Climate, soil, the abundance of minerals are the important factors that determine the general character of the neighbouring areas that offer trade by creating large demands and by supplying large surplus. It is the hinterland on which a trade centre mainly depends for its very existence, and as such the character of a city largely depends upon the nature of its hinterland. If the region is an agricultural one, the activities at the trade centre, will not be large and, therefore, the town would also be not of large size, but on the other hand if the hinterland is an industrial one, the activities involved at the trade centre would be large as the necessary raw materials required will have to be imported from different parts in large quantities, fuel, machine, labour, huge capital and other requirements are in demand and consequently the trade centre would be large.

Other factors governing the origin and growth of the trade centre are:—

(1) The commercial towns spring up at two locations (a) adjacent to some obstacle which hindered the further movement of men or goods and made it necessary to halt transport, break cargo and find further means of some travel.

(a) One of the greatest obstacles to land transport is large water bodies; and therefore great commercial cities lie at the line of contact between ocean and continent, where land travel ends and water transport begins, or *vice versa*. Duluth, Liverpool, New York, London, Hamburg are the important examples.

(b) Mountains are another obstacle, the barrier along the base of the Alps and Himalayas, are perfect girdles of cities, many of them located at the plain ends of the mountain passes, e.g., Peshawar, Turin, and Kabul. Similarly from Milan to Zurich and from Vienna to Lyons a girdle of cities encircles the Alps.⁴

(c) Arid lands are also effective barriers to communications, so that the margins of deserts have their towns. After a difficult crossing of these dry waste spaces, caravansarains, where men and animals may rest, obtain food and water, and business may be transacted are needed. Merv, Bukhara, Timbucto, Damascus, Karachi are representative of this type of commercial cities.

In brief "a study of the growth of cities in the past shows that what made the seed spring to life and guaranteed its growth was usually an obstacle. At borders of mountain barriers, at river-crossing on the edge of deserts on the sea-coast in short wherever it is necessary to halt and to find new methods of transportation, there is opportunity for city growth."⁵

(2) At the converge or crossing of important trade routes:—

(a) At the end of a barrier, where routes of travel converge as they are forced to go around the obstacle, are to be found especially favourable conditions for the growth of great trade centre. Chicago at the southern end of Lake Michigan, is strategically situated, not only because the lake barrier converges a large number of land routes towards its southern extremity.

(b) The main factor, thus, in the development of a trade centre is the junction of routes. (The towns must have feeders and distributaries to develop into a trade centre. The cities are placed in natural drainage basins, for nature's routes are most easy to utilize, either by floating goods down streams or by making road in the valley bottoms.) The railway junction plays a dominant part in developing trade by providing the facilities for the growth of collecting and distributing trade, e.g., Delhi, Winnipeg, Melbourne, Sydney. The facilities of transport have made Constantinople on the Black Sea and Kiev on the Dniپر for though little use is made of the banks of the river for manufacturing purposes its course is natural channel for the pilgrims and for the grain and wood trades of the south-western Russia.

(c) Rivers, however, provide a natural means of communications as indicated above, and hence the suitable sites of the

⁴ Vidal de La Blache, *Op. Cit.*, pp. 473-474.

⁵ Vidal de La Blache, *Op. Cit.*, p. 473.

cities are obvious on the confluence of two or more rivers, e.g., Allahabad, Lyons, Khartoum St. Louis, Coblenz, Nizininovogorada, Minz, Belgrade.

Another favourable site for a town growth is the limit of tidal navigation on an estuary or a river mouth. The heads of the fiord or estuaries, where deep water occurs close to the shore or where narrow creeks open out in swiftly running estuaries. Rangoon is of this type. London, Hamburg, New Castle, Bordeaux, Nantes, Baltimore, Philadelphia are other important examples.

(The towns also grow where a particularly favourable platform exists owing to the proximity of a river or sea and the presence of fertile soil, as on the river Deltas, e.g., Alexandria, New Orleans. River deltas also determine the site of the trade or commercial centres.) Such towns may be at the open mouth of the delta or to one side of the delta to avoid silting by tidal currents. Calcutta and Karachi are the important examples.

"The seaports are larger than the other cities. The chief cause of this difference is that the ports are helped both by the activity of their own hinterlands and by that of a great variety of other regions with which they can easily engage in trade because transportation by water is cheap. Seacoast cities are especially likely to receive not only products but also people, ideas and methods of work from other parts of the world. Besides this, a large share of the world's best soil is located along sea coast especially in delta plains. Sea coasts, too, are more healthful than continental interiors. They also have an unusually large share of land with general relief where both agriculture and transportation are easy."⁶

(Industrial cities are frequently also the great commercial cities for they find those items of location favourable to the movement of men and good features that favour the manufacturing of goods also. Great commercial centres are able to facilitate the assembling of raw materials and the dispersal of finished products, while the local market and labour supply are additional factors attractive to industrial concentration. Oxford, New York, Chicago, Jamshedpur, Kanpur, Shanghai, and Osaka are such examples.

(Certain minerals too have played a very important part in fixing the sites of towns, and this increasingly so in modern times. Several towns of Australia sprang into existence owing to the discovery of gold in their neighbourhood; others arose similarly in California, the Transval and later port Dawson and

⁶ E. Huntington, *Principles of Economic Geography*, p. 633.

other places in the Klondyke district. The minerals that have influenced the existence of towns in the most marked degree are coal and iron. As the discovery of the uses of steam and coal gas led to the invention of all sorts of machinery these minerals, when found together assumed an ever increasing importance, hence the complete transformation of that part of England now called the Black country. Now large cities are dotted over every important coal field in Europe and America and in very active centres, like South Staffordshire and Ruhr Region, the towns have spread to such a large extent that the whole district seems welded into one vast city outrivalling even London in populousness.

The several places from the religious point of view attract large number of occasional visitors from different parts of the country, and in order to supply them with necessities of life shopkeepers and businessmen assemble in large number giving rise to a town, which in course of time develops to a full fledged commercial centre also, e.g., Mecca, Jerusalem, Banaras, etc.

With the foundation of the residential Universities, various university towns are gradually in the course of formation. The large number of students coming from far and wide for getting education in these institutions require varieties of articles, to supply which merchants go and settle there. In a short time a city is formed where gradually population increases, e.g., Oxford, Allahabad, Dacca, Aligarh, Cambridge are the examples.

(The rapid growth of the overcrowded cities led to the growth of another types of towns called "Health resorts" or "Pleasure towns". The sea side pleasure town or the hill station is the direct outcome of the growth of insanitary and unhealthy industrial centres.) The men after working for certain continued months wish to recoup the lost energy and avoid exhaustion and hence go to the seaside towns, e.g., on the Riverian coast of France or the coastal towns of England and Florida. But in India the growth of health resorts are due to excess of heat in the plains during the hot season. Such places in India are Darjeeling, Murrie, Panchmarhi, Simla, Ootacamund, Nainital, etc.

The seats of the Governments and the native provinces also develop into flourishing towns.

Before the industrial evolution the cities were generally the capital of the countries or they were the favourite spots of the princes or were famous due to some historical importance, e.g., Udaipur, Ottawa, St. Petersburg, Constantinople, etc.

The Cantonments also develop sometimes in large towns. As troops and military forces are kept to watch and protect the

frontiers, from the dacoits so there is a gradual increase in the strength of population, e.g., Peshawar, Dera Ghazi Khan.

The presence of suitable drinking water in plenty is everywhere an essential condition for the development of a city or a trade centre. It was for this reason that London was located on the banks of R. Thames. But in modern times this factor has been of lesser importance, as the water supply can be obtained by pipe system even when the water resources are at a great distance, as is done in Bombay, which gets its water supply from long distances in the western Ghats, while London gets its from Wales.

(A suitable building site for the growth of a town is an indispensable factor, for towns can extend only there where large stretches of land are available in plenty, but where level areas are not available, the areas of gentle relief are preferred. Berlin in Germany and Calcutta in India are on level lands, but Paris and London both are situated in undulating relief.

Thus to sum up, (1) Some places develop as capitals of former ruling dynasties and owe their importance to their position as political centres, (2) Others situated on the rear land or waterways grow up as emporia of trade, (3) Others again are established as strategic citadels of defence against hostile raiders, (4) The existence of valleys, hills and plains, and the breaks of transportation which occur at national frontiers and at the junction of land and water routes tend to limit the number and increase the size of towns. So we find commercial centres at the confluence of rivers, heads of navigation, fiords meeting points of hills and plains; and other places where physical configuration requires a change of vehicle.

Cities are the products of commerce and industry and where these junctions have not flowered, cities are not numerous. Although it is true that large urban centres have existed from the very beginnings of great civilization it is more especially with the development of modern industrial commercial nations around the margins of the North Atlantic basin that cities have dominated the life of large regions.

Geographical Distribution of Cities. Cities are especially more numerous in:—(1) The northern U.S.A., (2) Western Europe, and (3) Japan. They are fairly numerous in (4) the southern and western U.S.A., (5) east and south of Europe, (6) China, (7) India especially in the Ganges valley, (8) the temperate part of South America from southern Brazil to Chile and (9) the regions of wet tropical agriculture in west and east Indies and on the coast of Brazil.

Another outstanding feature of the distribution of towns is

the large cities of tropical South America, south-eastern Asia, and practically the whole of Africa and Australia are located to the sea coast. The main reasons for this distribution are (1) the effect of climate upon human efficiency, (2) the effect of soil relief and climate on agricultural productivity, (3) the distribution of coastlines, (4) the location of minerals or other natural resources and (5) the stage of civilization.

In the following table are given some of the largest cities of the world:—

Largest Cities

London (1951)	8,346,137	Sao Paulo (1950)	2,227,512
New York (1950)	7,891,957	Los Angeles (1953)	2,104,663
Tokyo (1954)	7,665,369	Cairo (1947)	2,100,506
Shanghai (1952)	5,407,000	Philadelphia (1950)	2,071,605
Moscow (1939)	4,137,018	Detroit (1950)	1,849,568
Mexico City (1953)	3,795,567	Tientsin (1952)	1,795,000
Chicago (1950)	3,620,962	Vienna (1951)	1,766,102
Buenos Aires (1952)	3,403,625	Hamburg (1953)	1,722,800
Leningrad (1939)	3,191,304	Peking (1949)	1,688,000
Bombay (1951)	2,840,011	Sydney (1952)	1,621,040
Paris (1947)	2,725,374	Bucharest (1954)	1,600,000
Calcutta (1951)	2,548,697	Mukden (1952)	1,551,000
Calcutta (greater)	2,911,209	Madrid (1950)	1,527,894
Rio de Janeiro (1950)	2,413,152	Canton (1952)	1,496,000
Osaka (1953)	2,249,306	Madras (1951)	1,429,985

A port is a place from which and to which the exports and imports of the country are made. The ports are the gateways of commerce, i.e., it is a place on the water route where ships can find shelter and accommodation during the time they are being loaded or unloaded. These operations of the loading and unloading of cargo provides two chief characteristics of a port, without which its functions cannot be performed adequately. The following geographical factors are responsible for the origin and growth of modern ports.

(1) *Good Harbours* are suitable places for the reception of ships and for the loading and unloading of cargoes and the availability of the terminal facilities. There must be harbours, near the ports, for if not, a place cannot grow to be a good port. Harbours in olden days were the sheltered places or inlets where the small vessels of those times could secure protection

from stormy weather and attacks from the pirates and sea robbers and they were the chief ports in those days. But a good natural harbour cannot lead to a place of an importance of good port as it can be seen from these examples. Trincomalee is one of the finest harbours, but it is not a great port as it is not in the way of uscal trade routes. The western coast of Scotland and Norway abound in excellent harbours, but none of them are good ports as they have no populous hinterland, which at the same time is very mountainous.

Another important fact in this connection is that the harbours must not only be a sheltered place from the storms of the sea but they must be sufficiently deep to let the big steamers of these days come in and anchor safely. If the harbour lies on the estuary of a navigable river, the river will afford an easy outlet to the interior part of the country as New York, which stands on the estuary of River Hudson, and is navigable up to its source.

A natural harbour is generally an indentation in the coastline sufficiently enclosed or protected by its environment and topographical features to provide a tranquil water area for shipping, e.g., Bombay has a natural harbour, while Calcutta has not. Where there are no natural harbours, artificial harbours are constructed. In some cases the rich hinterland may account for the construction of an artificial harbour where no natural harbour exists. Artificial harbours are generally constructed in place where environments and topographical features are unfavourable. Breakwaters and dredgers are also used. The breakwaters are constructed with the object of breaking and dispersing waves for preventing agitation of water surface within the harbour area so that ships can lie in safety. Dredging is usually done, in places where the water is shallow, to keep the outlet deep. For example, greater part of the coastline of India is unbroken with the result that there are very few harbours to provide safe anchorage to the ships. So at Madras breakwaters have been constructed in front of the harbour in order to check the violent effects of the sea. Again, Calcutta has no natural harbour, but its harbour is artificial. The harbour of Calcutta gets silted very soon as the vast quantity of the soil brought by the mighty river system is deposited here, but this sand and silt is removed every now and then by use of dredgers. Again, Montevideo in S. America owes its construction and growth to the rich hinterland of the Parana Paraguay Basin. Large sums of money are thus regularly spent for deepening many such harbours. Breakwaters are also used for combating the destructive work of waves within the harbour so that shipping may lie in safe anchorage; this is specially important where the harbour space is limited. But it must be borne in mind that in these days of giant steamers the distinction be-

tween natural and artificial harbours has come to be of one degree only; for all the great harbours are now regularly dredged for the passage of ocean-going vessels. Thus the essentials of a good harbour are (1) an approach channel of ample dimensions, (2) adequate protection against storms and waves, (3) its coast line is so sinuous that there is sufficient space for docks and wharves, (4) ample area and depth, (5) it is wide enough to give space for large ships to turn in, (6) it is not troubled by ice, fog, currents or extreme tidal variations, (7) it is bordered by land that is well drained and yet so level to furnish space for the growth of a city and (8) it is easily accessible to the interior by routes which make it easier to bring goods to it.⁷

London, Liverpool, Le Harve, Southampton, Antwerp, Hamburg, New York, Boston, San Francisco, Rio de Janeiro, and Sydney are the important examples of deep water harbours of the world.

(2) *The Rich and Populous Hinterland.* The importance of the ports largely and mainly depends on the productiveness and accessibility of the regions they serve, e.g., their hinterlands. The hinterland may be defined as "the land which lies behind a seaport or a seaboard and supplies the bulk of the exports, and in which are distributed the bulk of the imports of that seaport or seaboard."

The importance of the hinterland in the development of a port is great. The high mountains lying in at the back of the port restrict the hinterland, as is the case of Akyab (in Burma), while a desert stretch backing a port gives it only an unproductive hinterland like that of Guador in Baluchistan. Again, Aden has but a poor hinterland. A level stretch of plain suitable for the purposes of cultivation and the development of the manufacturing industries and where consequently a dense population grows is a rich hinterland which accounts for the prosperity of a port. Calcutta, though has a poor harbour, enjoys an extensive productive hinterland extending over the Indo-Gangetic plain.

The hinterland must be productive for it is only the rich and productive hinterland that will have some surplus to send to the foreign countries in exchange of its necessary imports. But at the same time the hinterland must also be populous so that there would be demand for foreign goods and consequently the ships full of cargoes will visit the port. But the ships must have something to carry away and therefore, the hinterland must be productive also in one or the other commodities. "A

7 E. Huntington, *Principles of Economic Geography*, pp. 650-51.

dense population, rich economic products and perfect transport system; make a hinterland productive.

In short, hinterland should possess inducements for trade. Hinterlands are classified as contributory and distributory. A contributory hinterland is one which is concerned mainly with the exportation of raw materials and food stuffs, while a distributory hinterland is concerned mainly with the importation of goods and raw materials to supply the necessities of its inhabitants and the manufacturing industries their raw materials. But generally every port fulfils the dual functions of contributory as well as distributory hinterlands.

The same hinterland can serve several ports, thus Punjab is included in the hinterland of Karachi for the Arabian Sea trade and for the Bay of Bengal trade it belongs to the hinterland of Calcutta. As a general rule, the port which offers greater trading facilities than its rivals naturally has flow of traffic greater than other. With the development of the port of Bombay, the importance of the port of Surat has considerably shrunk as Bombay is in a better position than Surat so far as the attraction of traffic is concerned.

(3) *The Existence of Means of Communications.* A port must be well connected with its hinterland by quick and easy means of transportation and communication so that the goods brought by ships can be carried away inland to be distributed among the population and the goods produced in the hinterland may be carried to the port easily and quickly. *More elaborate the means of transport, more extensive is the hinterland, e.g.,* before the construction of railways in India (Deccan) Bombay was a very small port in comparison to Calcutta as it was cut off by the western Ghats from its hinterland of the Black cotton soil. It was not till after the establishment of the railway connection with the interior that Bombay rose to the position it holds now in the trade of India. Again, it is only due to the adequate and efficient railway connections that New York controls the much larger trade of U.S.A. than Boston though the latter is much nearer than New York to England. This analysis shows that if the hinterland of a port is rich and populous but has no connections with its ports, it cannot rise to an important position.

(4) *Climate is Another Factor* which not only affects the value of the ports and harbours but also of entire coastlines, for it is climate only which keeps the ocean free for navigation throughout the year; *e.g.,* not a single harbour along the entire northern coast of Russia, remains ice free for the whole of the winter, but now the coasts are usually kept open by the use of ice-breakers. The Baltic coastal ports also suffer from the same defect, but the ports along the north-western Europe remain

open and throughout the year because of the warm Gulf Stream while at the same time the ports on the northern and eastern portion of Canada remain ice-covered for nearly a quarter of the year due to cold Labrador current. Again, many of the northern ports of Germany would be closed for a part of winter were it not for the ice-breakers. To quote one more example Canada carries on trade during winter months through Halifax and Portland, because St. Lawrence remains icebound for several months in winter.

(5) *The Tidal Range.* Another factor determining the value of a harbour is the tidal range. The depth of water at high tides enables ships to enter and clear a port at that time and return with the flow of water so that even those harbours not enough deep can be reached without any expensive activity. But where the water does not permit this type of activity lighters are used for loading and unloading cargo.

(6) *The Port of Call.* The port which lies on the way of the usual sea route rises to an important position. The port of Havana in the west Indies had a very small volume of trade when sea route to the east was round South America in comparison to the value of trade it has in these days. It is due to the fact that after the opening up of the Panama canal the port lies in the way of the usual sea route. Again, the port of Honolulu in the Hawaii Islands is one of the best examples of the port of call. The port of call is generally a port of coal also, e.g., Aden.

Certain ports, where facilities offer, develop into the entrepot ports serving as junction ports between two streams of commerce. Entrepot ports are the ports which import commodities for the purpose of reexport. Really speaking, these ports act as middlemen and their main function is re-distribution. Vessels carrying on coastal trade pick up traffic from different ports and discharge it on one central port with facilities for handling cargo in bulk. Such collecting ports are entrepot ports. Cargo from these entrepots is handled in bulk and is, therefore, transported cheaply, the supply of tonnage being abundant owing to certain geographical factors. Development of better facilities may cause later on even the international commerce and not only the coastal traffic to be discharged in such entreports for purposes of economy. London and Rotterdam are two important examples, while Hamburg for Norway, Sweden and Baltic states is a good entrepot port, other important entrepots are Colombo, Singapore and Shanghai, etc.

A shipload of a British manufacture may be brought to an English port and part of it shipped on to continental ports or destined for a British Colony, may be sent to an English port and reshipped to its destination along with a cargo of British

goods. London carried on much of this entrepot trade as the remainder of the British ports together.

Domestic ports are those ports that deal in home trade. These ports are, however the result of the natural situation of the port of the hinterland and the economic development of the hinterland and the ocean routes.

Various standards and methods are employed for judging the importance and prosperity of the ports of which the important ones are as follows:—

- (i) The number of ships visiting a port during a year.
- (ii) The tonnage of the shipping.
- (iii) The tonnage of the goods discharged or landed in and out.
- (iv) The marketable value of the product dealt with.

The importance of the port can be judged adequately merely by the number of ships that visit every year for this presents the difficulty as the ship numbered may be either very small or very big in size. The size and importance of the vessels can be ascertained to a certain extent from the tonnage of shipping. While, the tonnage of goods handled by a port can also be a very good standard of comparison but this has got one drawback; it makes no distinction in the nature of goods, whether valuable or mere bulky or cheap.

Ocean ports may be divided into four classes according to the character of their harbours and their relations to routes on land.

(1) *Open Road Steads* are usually very poor because they do not afford good and safe harbours with sufficient depth and the protection from winds and waves are practically absent. They are rarely located near the mouth of large valleys and this hampers the transportation towards the interior. Bologne and Anlafogosta are the important examples.

(2) *Bay Ports*. Harbours at such places may be safe, commodious and deeper and there may be plenty of room for the docks. Boston is an example.

(3) *Riverine or Estuarine Ports* have the advantages of easy communication inland but they suffer from lack of depth and space for anchorage, docks and wharves. Rooms can only be found by extensive digging or by going far down the river, e.g., London and Calcutta.

(4) Ports with both a bay and a river are commercially

most advantageous. They usually combine safe and commodious anchorage with sufficient rooms for docks, wharves and with easy access to the interior.

GROWTH OF VILLAGES AND TOWNS IN INDIA

It is still true to say what Mahatma Gandhi told in his lifetime that "The Indian nation lives in its villages." According to the 1951 Census, there are 558,089 villages⁸—large and small, thriving or stagnating—in the plains and on the hills, dotted over the face 2,950 lakhs of the population—the average population per village being 529. The number of occupied houses in the villages is 541 lakhs so that each village on an average comprises 97 occupied houses and each rural household on an average consists of 5.5 persons.

In contrast to this, there are only 3018 towns in India with a total population per town being 20,510. The number of occupied houses in the towns is 103 lakhs so that each town on an average consists of 3,413 occupied houses and this gives almost exactly 6 persons to a house in a town.⁹

The table on the next page gives the distribution of population according to rural and urban areas since 1901.¹⁰

⁸ According to the *Census Report* for 1951, a village means "a cluster of houses whose inhabitants are regarded by themselves as well as others as a distinctive social unit with its identity marked by a distinctive local name. The village in the administrative sense is the *mauza*—a settled area with defined boundaries, for which village records have been prepared."—Vol. I, Pt. I, p. 42.

⁹ The average population per village as against per town:

1901	365	13,615
1921	465	14,016
1931	450.4	15,140
1941	517	18,365
1951	529	20,510

¹⁰ Vide *Census of India* for 1901, Vol. I, Pt. I, p. 572; *Ibid* for 1911; *Ibid*, for 1921, p. 3; *Ibid*, for 1931, 1941 and 1951.

PRINCIPLES OF HUMAN GEOGRAPHY

	1971	1911	1921	1931	1941	1951
<i>Area in Sq. Miles</i> ..	1,766,597	1,802,657	1,805,332	1,808,679		1,269,640
<i>No. of Towns and Villages:</i>	730,753	722,495	687,981	699,406	602,703	561,107
(a) Towns ..	2,148	2,153	2,316	2,575	2,703	3,018
(b) Villages ..	728,605	720,342	685,665	696,831	600,000	558,089
<i>No. of Occupied Houses:</i>	55,841,315	63,710,179	65,198,389		76,035,345	64,400,000
(a) In Towns ..	5,590,859	6,037,456	6,765,014		9,599,251	10,300,000
(b) In Villages ..	50,250,456	57,672,723	58,433,375		66,430,094	54,100,000
<i>Total Population:</i>	294,361,056	315,156,396	318,942,480	352,837,778	314,766,330	356,829,485
(a) In Towns ..	29,244,221	29,748,228	32,475,276	38,985,427	?	61,825,214
(b) In Villages ..	265,116,835	285,408,168	286,467,204	313,852,351	?	295,004,271
<i>Male:</i> ..	149,951,824	161,338,935	163,995,554	181,828,923	?	183,305,654
(a) In Towns ..	15,499,786	16,108,304	17,845,248	?	?	39,997,000
In Villages ..	134,452,038	145,230,631	140,150,306	?	?	143,337,000
<i>Female:</i> ..	144,409,232	153,817,461	154,946,926	171,008,855	?	173,523,821
(a) In Towns ..	13,744,435	13,639,924	14,630,028	?	?	35,349,000
(b) In Villages ..	130,664,797	140,177,537	140,316,898	?	?	138,190,000

The following table shows the variation in Census:

	<i>No. of Villages</i>			<i>Population (in millions)</i>		
	1911	1911	1951	1911	1941	1954
Under 500 Inhabitants.	552,109	450,902	380,020	102.0	94.2	78.3
500 to 1,000 Inhabitants.	107,545	123,911	104,268	74.6	86.9	72.9
1,000 to 2,000 Inhabitants.	45,843	57,408	51,769	62.2	79.3	71.1
2,000 to 5,000 Inhabitants.	14,643	22,151	20,508	41.2	63.4	59.1
Total Rural Population.	819,440	654,372	556,565	280.0	323.8	281.4

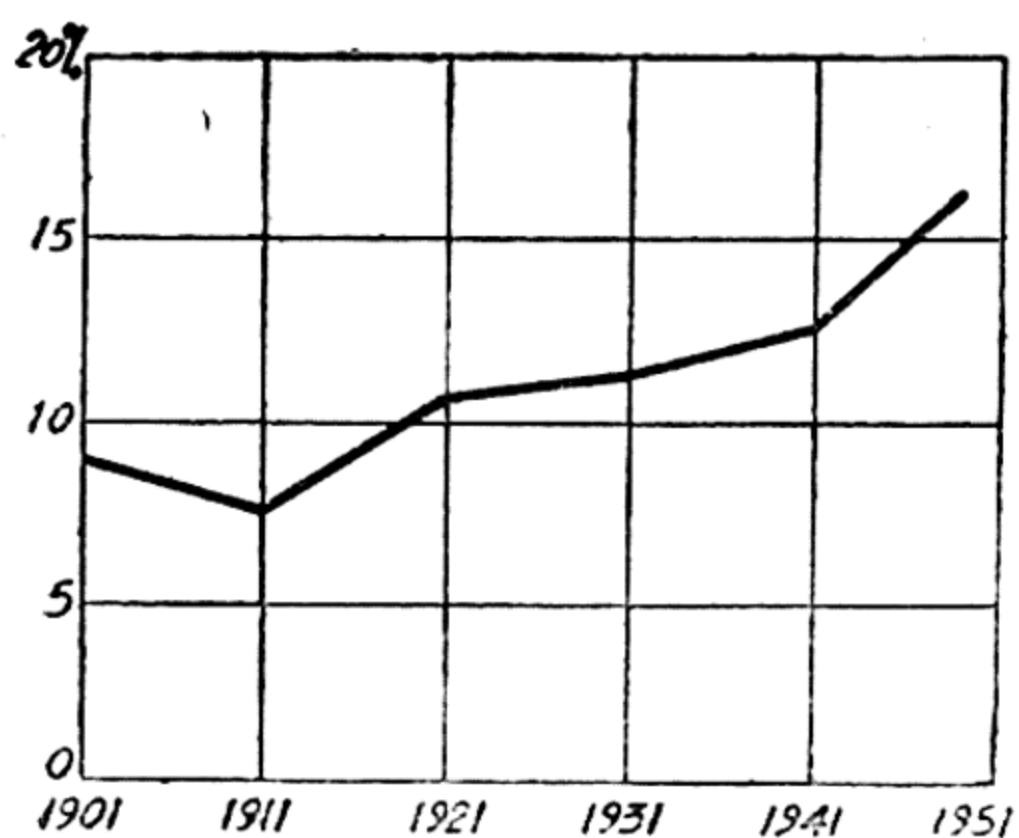
The following table which gives the rural urban ratio of the Indian population reveals how little progress has been made towards the urbanisation of India:—

The Rural-Urban Ratio of Indian Population

Census Year	Rural	Urban
1872	91.28	8.72
1881	90.59	9.41
1891	90.54	9.46
1901	90.12	9.88
1911	90.58	9.42
1921	89.80	10.20
1931	89.00	11.00
1941	87.20	12.80
1951	82.70	17.30

The very small proportion that the urban population bears to the whole is clearly indicated by the close relation between the variation in total population and that in the rural population as contrasted with the general antithesis between the total and urban populations. Since 1891, the total population of India increased only by 2.4% while that of the towns rose by 7.3% in 1901. During 1921-31 the total population increased by 10.6%, while there was an increase of 2% in urban and 9.6% in rural population. The Census of 1941 showed an increase of 32% in the urban population over the figure in 1931 as against 14.3% increase of the total population. While in 1941-51, the total population increased by 13.5%, there was an increase of 54% in urban and 7.4% in rural population. All the same the predominantly rural character of Indian population remains. Villages, i.e., localities with a population of less than 5,000, absorb about 83% of the people in the country. Population of 7 cities with one lakh or more inhabitants increased in the decade ending in 1951 by about 74 lakhs. Po-

population of towns with 5,000 to one lakh inhabitants increased by 140 lakhs..



Growth of urban Population in India

Fig. 36

In 1872 the percentage of urban population was 8.7% and at the beginning of the century it was between 9 to 10%. In western countries the percentages of urban population towards the beginning of the 19th century were: England and Wales, 21.3; Scotland, 17.0; France, 9.5; Prussia, 7.25; Russia, 3.7; and U.S.A., 3.8.¹¹

Urban development in India had progressed at the beginning of this century. In 1901, 1/10 of the population lived in places classified as urban and the remaining 9/10 in the villages. Of the citizens of towns more than $\frac{1}{2}$ were found in places with at least 20,000 inhabitants, about 1/5 in those towns with 10,000 to 20,000, and the same proportion in those from 10 to 15 thousands, while about 1/6 dwelt in smaller towns. Excluding Ajmer and Baroda the tendency to live in towns was most marked in Bombay, Rajasthan, Berar, and least in Bengal, Assam and Kashmir.¹²

In 1911, only 9.5 per cent of the population lived in towns (compared with 78.1 per cent England and Wales and 45.6 per cent in Germany) and 90.5 per cent in villages. More than half of the urban population was found in towns containing upwards of 20,000 persons, about 1/3 in towns from 10 to 20 thousands; the remainder about 1/5 lived in towns with less than 5,000. The tendency to urban agglomeration was most marked in the north-west and least so in the north-east. The proportion of urban to total population in the main provinces ranged from

¹¹ A. F. Weber, *Growth of Cities in the Nineteenth Century* (1899). Quoted by Dr. Gadgil in *Industrial Evolution in India* (1938), p. 139.

¹² *Census of India, 1901*, Col. I, Pt. I, p. 27.

18 per cent in Bombay to 3 per cent in Assam, 6 per cent in Bengal, 3.4 per cent in Bihar, 8 per cent in M.P., 11.7 per cent in Madras, 10.2 per cent in U.P., 13 per cent in Rajasthan. The reason for this variation were partly a matter of race and partly a matter of historical and political considerations. The proportion of urban to total population fell during 1901-1911 from 9.9 to 9.4 per cent. The main reason being the prevalence of the plague more in towns than in rural areas, which spread to all parts except the east and the south; also an epidemic in the towns of M. P., M. B., and U. P.; which drifted away the people to villages.

In 1921, only 10.2 per cent of the population lived in towns as against 89.8 per cent in the villages. The proportion of urban to total population varied from 19 per cent in Bombay to 4 per cent in Assam, 6.7 per cent in Bengal, 3.7 per cent in Bihar, 12.4 per cent in U.P., and 13.4 per cent in Rajasthan. The reason for this increase in urban population was that the conditions were improved.

Since 1921, there has been a gradual increase in the percentage of population living in towns and a smaller decrease in that living villages. This has been mainly due to the development of industries and transport in the country which facilitated the movement of surplus farm population to the towns in search of employment. The war also gave a great fillip to the increase in urban population.

The following table gives the percentage of rural population living in villages (of different dimensions) in the different zones:¹³

	Percentage of Rural Population living in—			
	<i>Small villages</i> (under 500)	<i>Medium-sized villages</i> (500 to 2000)	<i>Large villages</i> (2000 to 5000)	<i>Very large villages</i> (over 5000)
North India	29.8	55.3	13.5	1.4
East India	33.8	48.6	14.3	3.3
South India	9.4	38.5	35.3	16.8
West India	18.1	55.0	23.9	3.6
Central India	35.7	50.4	13.0	0.9
N.W. India	30.4	50.9	16.4	2.3
<i>India—Total</i>	<u>26.5</u>	<u>48.8</u>	<u>19.4</u>	<u>5.3</u>

From the above table it will be clear that more people live in medium-sized villages than in others.

As mentioned earlier, about 83 per cent of the population still live in the villages. The condition in the West is quite the

¹³ *Census of India, 1951, Vol. I, Pt. I, p. 43.*

reverse. In Western countries the percentage of rural population varies from 44 per cent in U.S.A., and Germany to 68 per cent in Sweden; 29 per cent in Italy; 58 per cent in France; 23 per cent in England and Wales; 55 per cent in Austria; 59 per cent in Canada and 36 per cent in Japan. The percentage of rural population ranges from 92.5 per cent in Bihar to 85.7 per cent in U.P.; 78.9 per cent in Madras; 67 per cent in East Punjab Union; 80 per cent in Rajasthan; 50 per cent in Saurashtra; 78 per cent in Travancore-Cochin; 57 per cent in Ajmer and 99.4 per cent in Manipur and only 17.5 per cent in Delhi.¹⁴

DEFINITION OF TOWN, CITY, ETC.

The chief defect in the statistics of urban population in India is that the definition of a 'town' has varied from Census to Census. Not only this, but the Provincial Superintendents of the Census have interpreted this definition each in his own way.¹⁵ The Census authorities have divided the two into various classes, as given in the table below. Even the Census Commissioner for 1951 gives a four-fold classification of towns—those that have a population of one lakh and over are termed as 'cities'; those with a population between 20,000 and 100,000 as 'major towns'; those with a population between 5,000 and 20,000 as 'minor towns' and those with a population under 5,000 as townships. According to this classification the pattern of India's urban population is as shown below:

Classification	No. of towns	No. of town dwellers (in lakhs)	Urban population percentage
Cities	73	236	38.0
Major Towns	485	186	30.1
Minor Towns	1,848	178	28.6
Townships	612	20	3.3
	<hr/> 3,018	<hr/> 619	<hr/> 100.0

¹⁴ Calculated from the figures given in *Census Paper*, No. 1 (1951), pp. 16-22.

¹⁵ e.g., in Uttar Pradesh towns have been classified as "(a) every Municipality, (b) every notified area, (c) every town area, (d) cantonment, and (e) any other continuous group of houses permanently inhabited by usually not less than 5,000 persons which the State Supdt. of Census operations decided to treat as Census Form."

In West Bengal, a town is "(a) an area, irrespective of population, which has been declared to be a municipality, and (b) which has a population of not less than 5,000; (c) a density of not less than 1,000 inhabitants per square mile, and (d) the area has some importance as a centre of trade or distribution or administration, and about three-fourth of the adult male population are chiefly employed in pursuits other than agriculture."

"The fundamental criterion" in Madras is reported to be "the existence of urban features—which can be judged by the way in which houses are situated and how they have been built and the availability of urban amenities (such as bazar facilities for education, recreation and medical treatment)."

Urban population classification	1872		1881		1901		1911		
	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.	
Towns of 100,000 and over	..	4,321,917	5,295,097	30	6,173,123	31	6,605,837	30	7,075,782
50,000 to 100,000	..	1,856,297	2,411,470	48	3,255,175	52	3,414,188	45	3,010,281
20,000 to 50,000	..	3,338,490	4,470,995	148	4,448,034	166	4,904,461	181	5,545,820
10,000 to 20,000	..	3,634,373	4,842,072	407	5,487,983	471	6,457,339	442	6,163,954
5,000 to 10,000	..	3,587,372	5,029,457	896	6,164,900	856	5,938,957	848	5,944,503
Below 5,000	..	1,344,035	1,886,291	505	1,642,026	569	1,879,465	607	2,007,880
Total urban population	..	18,082,484	23,935,382	2,034	27,171,241	2,145	29,200,247	2,153	29,748,228
Total population	..	206,162,360	287,314,617	287,006,054	294,317,082	313,488,137			
				</					

As pointed out earliler the percentage of total population living in the towns has been very small; although of late it has been increasing. The following table gives the percentage of urban to total population:

	1891	1901	1911	1921	1931	1941	1951
100,000 and over	2.2	2.2	2.2	2.5	2.7	4.0	6.5
50,000—100,000	1.1	1.2	.9	1.1	1.3	1.6	2.1
20,000—50,000	1.6	1.2	1.8	1.9	2.3	2.5	3.3
10,000—20,000	1.6	1.7	.9	2.0	2.1	2.6	3.2
5,000—10,000	1.9	2.2	1.9	2.0	2.0		
Under 5,000]	1.1	1.4	.7	.7	.6	2.1	2.2
<hr/>							
Urban Pop. ..	9.5	9.9	9.4	10.2	11.0	12.8	17.3
Rural Pop. ..	80.5	89.1	90.6	89.8	89.0	87.2	82.7
<hr/>							
Total—Pop. ..	100.0	100.0	100.0	100.0	100.0	100.0	100.0

FACTORS AFFECTING THE GROWTH OF TOWNS

The slow urbanisation points to the fact that we are still a backward country. Over a long period the proportion of the urban to the total population has remained almost unaltered except in the last two decades, when this proportion has changed considerably. In England, the development of new industries brought about a rapid industrialisation of the population, of which a large percentage lives in towns. From the point of view of the urbanisation test, India has tremendous lee-way to make up.

The time-worn saying that God made the village and man made the town offers a key to the study of the evolution of Indian towns and cities.

(1) Railways and navigation have brought into existence new commercial centres and have increased the importance of some of the old ones. The advent of railways to a town meant generally an increase in trade and it also had the effect of creating new centres of trade in the tract through which it passes. One of the earliest results of the British rule was the growth of the great mercantile centres, which were connected with each other by railway lines, and it might be said that the British have played the role of town-builders in India. Bombay, Madras,

Kanpur, Calcutta, Delhi, Bangalore and Hubli serve as illustrations of the new commercial towns. Railway junctions by affording facilities for the growth of a collecting and distributing trade give rise to towns, and in many cases they form the centres of manufactures or industries connected with the railways. Kharagpur, Gorakhpur, Moghalsarai, Ajmer, Jubbulpur, Kanchanpur, Waltair, Arkonam and Raichur are important railway settlements. Delhi is essentially a model city being connected by railways with Calcutta, Bombay and Amritsar.

(2) The rivers of northern India have played a very important part in the development of towns. Indian town-planners have preferred sites on river-banks, sea-coasts or on land routes. The orthodox treatises on townplanning make it a rule to establish towns on the right bank of rivers. Consequently, all Hindu towns in India are situated on the right bank of rivers. Hence, any town in India whose location violates this rule, e.g., Calcutta, may be presumed to have grown up or been established under non-Hindu influence.¹⁶ This explains to some extent the development of the cities of Allahabad, Agra, Kanpur, Patna, Monghyr, and Hooghly on the right bank of the Ganga. Most of these cities have grown at points where the river takes a wide bend, as the position is favourable to the landing and loading of goods in boats. These river towns owe their importance to the development of trade in goods in large quantities which break bulk.

River fords also develop towns, e.g., Cuttack on the Mahanadi, Bezwada on the Krishna and Rajmahendri on the Godavari. Navigable rivers offer a very suitable site for the development of a sea-port near their mouths, but the importance of the ports depends also on the prosperity of the hinterland and the availability of the facilities for safe harbourage. Surat on the Tapti, Broach in the West Coast, and Calcutta are the prominent examples of this type of ports but while Surat and Broach have declined, the latter has developed considerably.

(3) Places sacred from the religious point of view attract large numbers of occasional visitors. Banaras, Hardwar, Gaya, Mathura, Puri, Brindaban and Nathdwara in Northern India, and Madura, Tanjore, Conjeevaram and Nasik are the principal religious centres in the South.

(4) With the foundation of residential universities various university towns have gradually been formed, e.g., Aligarh, Patna, Rajmahendry, Mysore and Annamalai Nagar, and Vallabhnagar.

(5) Owing to the intense heat in the plains of India it is

16 B. B. Dutt, *Town Planning in Ancient India*, p. 28.

often necessary for the well-to-do population to go to the bracing climate of the hills and the sea-coasts. The Himalayan slopes, covering a height of 5,000 to 8,000 ft. have furnished some of the important hill-stations of Northern India, while in the Nilgiris we find some of the loveliest hill-resorts of South India. The expansion of the hill-station depends, in addition to its attitude on the facilities of transport, on the availability of level space for house-building, while if the site chances to be selected also as the official summer-residence of the State Heads it acquires an additional importance. Muree, Darjeeling, Dalhousie, Simla, Nainital, Mussourie and Almora in Northern India, and Kodai-kanal, Coonoor and Ootacamund in Southern India, are important hill-stations. The east coast of India with its shallow water is suitable for sea-bathing. Hence, Puri, Gopalpur, Waltair and Madras are the principal sea-side resorts in the east while Juhu near Bombay is most important on the west-coast.

(6) "A city," as Prof. Geddes has remarked, "is not only a place in space, it is also a drama in time." The geographical factor or the factor of situation alone does not explain the development of a town, as the historical and economic background has also to be taken into account. Many towns have grown or decayed in India owing to the changes in the political history of the country, e.g., Fyzabad, a town of historical importance, was shorn of its glory when Asafuddaula began to dislike it and transferred his capital to Lucknow. Delhi regained its glory as the result of the change in the capital of India. Hence, the original cause of the foundation of a town may be its suitable natural situation, or the historical factor but, its development is principally determined by economic causes chief among which are the expansion of trade and commerce and the development of organised industries. Industrial factors have played a very important part in the growth of towns. The leading industries of the country have contributed to the conversion of villages into towns and towns into cities. Bombay, Ahmedabad, Hubli, Sholapur, in Bombay; Titagarh, Kankinara, Budge Budge, Kamarhati, Naihati in Bengal; Naini, Ferozabad, Kanpur, Moradabad in U.P.; Amritsar in East Punjab; Bilaspur, Jubbulpur, and Katni in M. P.; Bisra, Maihar and Gwalior in M. B.; Rajkot and Okha in Saurashtra; and Burnpur, Jamshedpur and Jhala in Bihar have developed mainly due to the existence of one or more industries like cotton, woollen, sports, printing glass, chemicals, cement, iron and steel, etc. These industrial towns are not fettered by the consideration of the local food supply as they can command a wide area for it. They spring up either (i) at centres having proximity to raw materials, e.g., Bisra, Sholapur and Dindigal, or (ii) having proximity both to raw materials and supply of fuel, e.g., Jamshedpur, Burnpur and Nagpur, or (iii) close to the port of export like the mill-towns close to

Calcutta or Okha, or (iv) at convenient railway centres like Jubbulpur, Kanpur and Moradabad. Centres for the collection and partial manufacture of important raw materials have also developed into towns. Amraoti, Wardha and Nimar in M. P., Broach, Nasik, Ahmednagar, Dharwar and Belgaum in Bombay are important towns of the collection of raw cotton.

The development of these industrial towns is not out of all proportion to regional consideration as their size is limited only by the extent of manufacture and prosperity of the industry, e.g., the rapid expansion of Jamshedpur is principally due to the springing up of a large number of industries in the immediate neighbourhood which are connected with the steel industry. The development of Mirzapur as an industrial centre has been arrested owing to the gradual decline of the lac industry and the manufacture of brass utensils. With the development of the sugar mill, the cement factory and the paper mill, Dehri-on-Sone (Dalmianagar) in Bihar, and Modinagar in U.P., have developed into important industrial centres. Similarly, with the gradual concentration of a number of industries, Coimbatore has increased in size and importance while the coalmining towns of Bengal and Bihar have received a set-back due to the slump in the coal trade.

(7) Mining towns spring up close to the site of the mines, hence unless the deposits are concentrated within a small area these towns cannot increase in size. The Bihar mining towns have not attained large dimensions owing to the occurrence of the deposit over a wide area and the mobile nature of the labourers employed there. The Kolar gold-field owing to the compactness of the deposit and the facilities of electric supply from the Sivasamudram Falls is in a position to support an ever-increasing population.

(8) Besides the above factors, famines are among the causes which deplete the country-side and increase the volume of the urban population, e.g., due to the great Rajputana famine of 1868, Agra, Delhi and other adjoining towns almost doubled their population.¹⁷ It may happen that a part of this addition is permanently absorbed by the occupations in towns, though most of it is certainly lost owing to people returning to their villages after the advent of the rains.

(9) The rise of a class of landless labourers in the villages as a result of the famines and the dispossession of the old peasant proprietors and the transformation of artisans into wage-earners, also promotes urbanisation to some extent, for the landless

¹⁷ D. R. Gadgil, *The Industrial Evolution of India*, p. 142.

labourer is often ready to migrate to towns if he can find employment there.

(10) The city life has a great charm for the middle-class people. Electric light, running water, tram and bus, large general hospitals, specialised and advanced clinics with the latest equipment, all play their part. Educational facilities like universities, colleges, libraries and academies, and recreational facilities like parks, sports, games, cinemas and theatres, are some of the attractions of the towns. In fact, the comforts and the amenities of life in big towns and cities are responsible for increase in their numbers. Administrative centralization has increased the urban importance of the district headquarters and the provincial or State capitals and the *taluka* towns in comparison with the villages.

Factors leading to decay of Towns in India. Side by side with the increasing urbanisation must be noticed the tendency of the older towns to be depopulated.

Firstly, changes in regional values and diversion of trade routes in many cases brought about the decline of towns which previously owed their prosperity to the command of river and road traffic, and now superseded owing to railway extensions, e.g., Mirzapur on the Ganga, Patna, Saugor, etc. The engineer cannot always contrive to construct in such a way that railway line should pass by the old urban centres, so that on being left alone away from the main line, some of them have naturally dwindled in importance. Many old towns in Lower Bengal were thus ruined on account of the changes in the course of the Ganga.

Secondly, the decay of urban handicrafts, following the disappearance of the old Royal courts, the rise of European competition, the influx of foreign education and the creation of Indian bourgeoisie, has brought about a decrease in the population in old towns like Tanjore, Amritsar, Murshidabad, etc. Even the sacred towns like Gaya and Banaras are losing their importance as a result of the fall in demand for the products of the old industries of these towns.

Taking into account the two opposite tendencies of the growth and decline of towns, we reach the conclusion that they have so far just balanced each other, though in recent years the tendency to urbanization is slightly gaining the upper hand.

In this connection two things may be noticed. First, that in India the growth of industries has been taking place very slowly. Whatever little growth in towns there has been is due much more to the growth of commerce than industry. Secondly, there is a complete absence from India of any big town-aggregates or what Prof. Geddes calls, "conurbations." The only

town aggregate at all resembling the big town groups in Western countries is the group of jute towns on the river Hooghly, along with the city of Calcutta. It consists of six cities (Calcutta, Howrah, Tollygunge, Bhatpara, Garden Reach and the South Suburbs), twenty one major towns and eight minor towns. Delhi consists of two cities, three major towns and one minor town.

GROWTH OF CITIES IN INDIA

Raymond Pearl has remarked:

"The process of urbanisation down through the ages has led to the formation of great metropolitan centres . . . in which so large a proportion of present-day men live out their allotted spans. They represent one of the many quaint ways in which mankind is coming to resemble more and more clearly the termites in modes of life and social philosophy."¹⁸

The great significance of large cities (i.e., cities with a population of one lakh and over) was stressed by A.F. Weber at the end of the last century.¹⁹ Since then such units, known as great cities, have attracted special attention as typical of urbanization.

Of such cities, India has 75 according to the Census Report of 1951. Of these four are really the suburbs of the metropolis of Calcutta and of Delhi. Till 1941, the Delhi extension of Sahadara and even the growing town of New Delhi were included under Delhi. Similarly, not only Tollyganj and the South Suburban towns but also the great city of Howrah were discussed as a single unit along with Calcutta by the Commissioners of Census of 1921 and 1931. Garden Reach, Tollyganj, and the South Suburbs are all extensions of Calcutta on the south and south-east. Contrary to the current foreign practice in this respect, I have treated Delhi and New Delhi as one great city and Calcutta along with Howrah, Tollyganj, Garden Reach and the South Suburbs as another. India has, therefore, seventy great cities each with a population of one lakh or more. This number compared with the number of similar units in other countries is by no means sufficient for the integrative, economic and cultural needs of a vast country and of a great population like that of India.

Even if the number of great cities may be relatively small they can, if their territorial distribution is well adjusted, discharge their socio-economic functions and thus serve their coun-

¹⁸ R. Pearl, *Natural History of Population*, p. 267

¹⁹ A. F. Weber, *The Growth of Cities in the Nineteenth Century*, p. 16.

try more or less properly, as for example, the French cities do for France. In the following table is presented an analysis of the territorial distribution of the great cities during the previous six Census years:

Number and Territorial Distribution of the Great Cities

<i>Territory</i>	1881	1891	1921	1931	1941	1951
India	18	22*	23*	29*	47*	70**
Bihar	1	1	1	1	3	5
Bombay	4	5	5	5	6	8
Hyderabad	1	1	1	1	1	2
Madhya Bharat	Nil	1	Nil	2	2	3
Madhya Pradesh	Nil	1	1	2	2	2
Madras	1	1	3	4	6	13†
Mysore	1	1	1	2	3	3
Orissa	Nil	Nil	Nil	Nil	Nil	1
Punjab	1	1	1	1	3	3
Rajasthan-Ajmer	1	1	2	2	4	4
Saurashtra	Nil	Nil	Nil	Nil	1	3
Travancore-Cochin	Nil	Nil	Nil	Nil	1	2
Uttar Pradesh	6	7	6	7	12	16
West Bengal	1	1	1	1	2	3
Delhi	1	1	1	1	1	1

*Srinagar had to be omitted for want of data in 1951.

**Srinagar omitted. Howrah, Tollygunge, Garden Reach, and the South Suburbs are grouped with Calcutta as one city. New Delhi, too, is grouped with Delhi as one unit. Bhopal included in the total.

†Of which 4 are in Andhra.

With 1881 begins the era of reliable census returns. Many of the railways, particularly in Northern India, had already been laid down. And India began with 18 great cities. From the above table it will be seen that five of the large territorial units were without a single great city. U.P. led with six great cities to its credit, Bombay followed with four and the other territories had one each. The preponderance of great cities in C.P. was partly due to the larger railway system already introduced and partly also to the military contingency. The next decade proved to be a fairly progressive one. In consequence, in 1891, there were 21 great cities. The disparity in their territorial distribution was both reduced and enhanced. Two of the territories which had been without any great city threw up one great city each. On the other hand, U.P. and Bombay each added one great city to their previous total.

With 1891 begins the era of bubonic plague which, in various parts of the country, affected the cities till 1911 and even later. The epidemics of influenza and cholera did their worst in 1918-19. The Census Year of 1921 dawned fairly clean and propitious. From that date till 1951 India may be said to have been free from major epidemics. This happy situation is very well reflected in the steady but continuous increase in the number and size of the great cities during the period between 1921 and 1951. The territorial distribution for 1931 reveals that the process of levelling the imbalance had hardly begun. Madras had thrown up 4 great cities to vie with Bombay with its 5 great cities. Four other territories participated in the process by adding one great city each to their previous singletons. This is the period in which the national struggle for freedom began to be militant. Better distribution of great cities reflects the pulsation of this creative impulse. The nascent impulse, however, materialises in the next period.

1941 opens with a big addition to the number of great cities. 47 great cities, much better distributed than the 29 of the previous decade, is a record advance, not even equalled by the progress of the next decade. Looking to the 70 cities of 1951, one finds that none of the 15 major territories is now without a great city. In spite of territorial accretions, Bombay has yielded its second place in respect of great cities to Madras which now vies with U. P. in this respect. It is very significant that U.P. should have managed to keep its lead by two wide jumps in two successive decades. It added to its total 5 great cities in 1941 and 4 in 1951. Leaving aside the case of Delhi territory which is special, we find that Orissa is the only major territory which has a single great city, whereas it had no great city before 1951. Assam has none even today. It may be concluded that as against 1881 the situation of 1951 in respect of the territorial distribution of great cities is a distinctive advance. India today has her comparatively small number of great cities fairly well placed for the discharge of the administrative, economic and social functions, i.e., the integrative functions of great cities.

The following table gives the distribution of the great cities on the basis of area and population:

Distribution of Great Cities on the Basis of Area and

Territory	Population (1951)	
	One great city per so many sq. miles	One great city per so many persons (in 000)
India	17,738	5,098
Bihar	14,066	8,045

Bombay	13,929	4,495
Hyderabad	41,084	9,328
Madhya Pradesh	65,136	10,624
Madras	9,830	4,386
Mysore	9,829	3,025
Punjab	12,454	4,214
Rajasthan-Ajmer	33,156	3,996
Uttar Pradesh	7,088	3,951
West Bengal	10,258	8,270

It will be seen from this table that in India as a whole there is one great city for about 51 lakhs of people. Lewis Mumford opines that in American conditions of life a city of one million persons is necessary to support a university.²⁰ Though Indian life has not yet attained the stage of development to be met with in America it may be safely said that one great city per 50 lakhs of persons is not an adequate provision for socio-economic integration. The area, too, to be served by such a centre is rather large. Mysore with one great city for 30 lakh people and for less than 10,000 sq. miles is about the best in the prevalent conditions. But even in this case one cannot consider the situation as ideal or sound. M.P. with one great city for 65,000 sq. miles and for 106 lakhs of persons has to make much lee-way to provide an adequate number of great cities for proper services of integrative and cultural kind.

The inadequacy of the number of great cities for the needs of the area and the people can further be judged by reference to the percentage which the population of its great cities forms to the total population of the territory. These data are provided in the table below for the last two census years for which alone strictly comparable figures are available. Of the total Indian population of 1951, only 6.8 per cent was resident in such cities, as against 5.3 per cent in 1941. The 1951 percentage, being about 28 per cent higher than that of 1941, is an advance. West Bengal has one city for nearly 83 lakhs of people and thus ranks very low in the matter of provision of great cities for its population. Because of the size of Calcutta, it ranks first in respect of the percentage which the population of its great cities bears to its total population, i.e., 14.6 per cent of the total population living in great cities. Bombay comes next with 14.1 per cent followed by Mysore with 13 per cent. Rajasthan has one great city for about 49 lakhs of people and Bihar for a little over 80 lakhs of people have only 3.6 and 2.1 per cent respectively of their population living in great cities.

²⁰ L. Mumford, *Culture of Cities*, p. 487.

*Percentage of Total Territorial Population formed by the
Population of Great Cities*

Territory	1941	1951
India	5.3	6.8
Bihar	1.3	2.1
Bombay	10.6	14.1
Hyderabad	4.5	6.5
Madhya Pradesh	2.4	3.3
Madras	3.1	5.9
Mysore	9.4	13.0
Punjab	5.0	5.1
Rajasthan-Ajmer	4.1	3.6
Uttar Pradesh	4.7	6.2
West Bengal	12.9	14.6

The total population living in these great cities amounted to a little over 2.4 millions in 1951. Naturally it is differently distributed in the various major territories. In addition to the variation in the number of great cities the differences in size are taken into account when we study the percentage distribution of the total population of great cities in the different major territories. Its significance may be realised by a look at the table given below:

Percentage Distribution of Total Population of Great Cities

Territory			1881	1891	1921	1931	1941	1951
Bihar	..	..	3.8	3.3	1.9	1.9	3.1	3.6
Bombay	..	..	24.6	28.5	28.3	23.3	20.8	21.0
Hyderabad	..	..	8.1	8.2	6.3	5.7	4.9	5.1
Madhya Pradesh	..	..	..	2.3	2.2	3.9	3.2	2.0
Madras	..	..	9.0	9.0	12.3	13.0	10.5	14.0
Mysore	..	..	3.4	3.6	3.7	5.0	4.7	4.9
Punjab	..	..	3.3	2.7	1.1	3.2	4.3	2.7
Rajasthan-Ajmer	..	..	3.2	3.2	3.6	3.2	3.8	2.4
Uttar Pradesh	..	..	23.4	23.6	16.0	15.7	17.6	16.2
West Bengal	..	..	17.4	17.5	20.0	17.2	18.9	14.9

Bombay, which in respect of the number of great cities, is third among the territories, and in respect of the proportion formed by the population of its great cities to its total population only second, leads in this percentage distribution by a large margin. 21 per cent of the population of the seventy great cities of India lives in the great cities of Bombay. U.P. comes next but it accommodates in its great cities only 16.2 per cent of the total population of the seventy great cities. West Bengal with 14.9 per cent follows U.P. much more closely than the latter does Bombay. The great cities of Madras account for 14 per cent of the total population of the great cities of India. These four territories are the great giants.

It is interesting to note that the picture in the previous census years revealed by the above table is hardly different from that of 1951. For example, both in 1881 and 1891 the ranking of major territories in respect of the percentage distribution of the total population of great cities, was, with only two exceptions in the latter year, the same. Only the size of differences has changed. But even here the relative difference between Hyderabad, which has always figured next to Madras, and the latter is now very much greater, while Mysore which was next to Hyderabad by a very large margin now shows only the slight difference of 2 per cent. The widened difference between Madras and Hyderabad established by the figure of 1951 lifts the four major regions of Bombay, U.P., West Bengal and Madras into a category by themselves as the resorts of great city-dwellers. The order in respect of percentage distribution in 1891 as Rajasthan-Ajmer, Punjab and M.P., has changed to one of M.P., Punjab and Rajasthan-Ajmer.

Percentage Variation in Population Living in Great Cities

Territory			1881-91	1891-1921	1921-31	1931-41	1941-51
India	..	..	+21.7	+10.0	+28.1	+82.2	+61.9
Bihar	..	..	-3.2	.27.4	+33.1	+192.4	+83.4
Bombay	..	..	+37.6	+20.5	+4.2	+60.8	+64.1
Hyderabad..	..	..	+17.0	+2.6	+15.5	+58.3	+64.9
Madhya Pradesh	..	..	..	+24.1	+120.0	+50.3	+47.0
Madras	..	..	+11.8	+73.7	+36.4	+45.7	+116.2
Mysore	..	..	+15.7	+32.2	+73.4	+67.1	+71.1
Punjab	..	..	-7.8	+15.9	+67.6	+142.4	+1.6
Rajasthan-Ajmer	..	..	+11.4	+42.2	+12.8	+111.3	+1.5
Uttar Pradesh	..	..	+10.7	-18.3	+25.0	+102.3	+40.1
West Benhal	..	..	+12.2	+45.8	+11.7	+98.3	+28.4

It is seen that the largest percentage increase in the population living in great cities of India as a whole occurred in the decade 1931-41. The percentage increase is larger by 193 per cent than the percentage increase of 121-31. The percentage increase of 1941-51, is only about 75 per cent of that of 1931-41. In harmony with the behaviour of the great cities of India as a whole, have moved Bihar, Punjab, Rajasthan-Ajmer, U. P. and Bengal, all of them showing the greatest percentage increase in population living in their great cities in the decade 1931-41. Madras, Hyderabad and Bombay preferred to lag behind and achieve their highest percentages of increase in the next decade. The difference between percentage increases of the last two are fairly small and may be credited to political events. Madras had a percentage increase of 154 per cent; this shows that the State of Madras is well set on the path of urbanization since 1941.

The behaviour of the two States, M.P. and Mysore, distinguishes them as early starters, both of them having registered their percentage increase in the decade 1921-31. The percentage increase in M.P. is simply phenomenal, the percentage increase of 1921-31 being nearly five times that of the previous decade and 2.4 times that of the succeeding one but now it appears to be on the wane. Mysore has registered only a small decrease in the percentage increase of the next two decades.

The rate in the growth of great cities can be judged from the percentage variation in the population of individual cities given on the next page.

Cities	Population (1951) (in lakhs)	1872-81	1881-91	1891-1901	1901-11	1911-21	1921-31	1931-41	1941-51	
Calcutta (with Howrah)	..	45.78	-3.1	+12.5	+22.9	+11.0	+4.3	+11.9	+67.4	+19.9
Bombay	..	28.39	+20.0	+6.3	-5.6	+26.2	+20.0	-1.2	+46.0	+67.5
Madras	..	14.16	+2.1	+11.5	+12.6	+1.8	+1.6	+22.8	+20.1	+47.0
Delhi	..	13.83	+12.3	+11.1	+8.3	+11.6	+30.7	+47.0	+37.8	+93.3
Hyderabad	..	10.86	..	+13.0	+8.0	+12.0	-19.0	+16.0	+58.0	+47.0
Ahmedabad	..	7.94	+6.6	+16.3	+25.3	+16.6	+26.4	+14.5	+88.2	+33.3
Bangalore	..	7.79	..	+15.7	-11.8	+19.1	+25.3	+29.0	+32.4	+92.3
Kanpur	..	7.65	+23.4	+24.9	+4.5	-12.0	+21.2	+12.6	+100.0	+44.8
Poona	..	5.89	..	+25.8	..	+5.3	+23.9	+16.5	+11.2	+73.0
Lucknow	..	4.07	-8.2	+4.4	-3.3	-1.6	-4.6	+14.2	+40.8	+28.4

²¹ *Census of India*, 1921, Vol. I, Pt. I, p. 72; *Ibid* for 1931, p. 50 and *Census of India*, Paper No. 1 (1952), pp. 24-25.

To give a more generalised idea it may be pointed out that the 21 great cities of 1891 (leaving Meerut which ceased to be a great city from 1911 to 1941) increased by 16.6 per cent, 17.6 per cent, 54.1 per cent and 45.6 per cent during the periods of 1891-1921, 1921-31, 1931-41 and 1941-51 respectively. It is seen that the percentage increase of one single decade, 1921-31, is greater than the percentage increase of what occurred during the previous 30 years. The percentage increase of the last decade though only 84 per cent of the greatest percentage increase, which occurred during 1931-41, is about 158 per cent greater than that of the decade 1921-31. We may conclude that the bigger and the older of the great cities are becoming larger and larger at a more rapid pace, than the newer and the smaller ones, for in 1941 there were 17 units which became great cities; they increased by 48.4 per cent during the decade 1931-41, whereas they had increased in the previous decade of 1921-31 by only 24.5 per cent, though all of them had already been smaller cities (or Class II towns as the Census Reports designate them). The 23 units which became great cities in 1951 had increased only by 29.1 per cent during 1931-41. We may, therefore, conclude that Class II towns very much quicken their pace of growth when they arrive at their last reach for quality as great cities.

The growth of population in cities can hardly be regarded as due to natural increase. The city population has a lower birth rate than the rural population. The death rate in cities is likewise higher than in rural areas. This is to be expected when we remember that cities are insanitary and the diet is poorer than that in the country. We can only conclude that the growth of population in the cities is largely due to migration. We have no satisfactory statistics of such migration. The Census every ten years is our only guide, unsatisfactory as these returns are. The Census of 1931 lists the percentage of city residents in different provinces who were born outside the cities. Davis gives us an average of 37.4 per cent born outside the cities on an analysis of figures of the total population of 26 cities. "More than a third of the inhabitants of India's major cities are born outside the city in which they live." The refugee movement during the last 7 years must naturally increase the percentage to a phenomenal extent. Generally speaking, it is only economic pressure that induces the rural population to migrate. The peasant's traditions and associations make him prefer to remain in the village rather than in the city, with its slums, its absence of sanitary conveniences and its scarcity of good food. He is tempted to stay in the city, away from his family, for only a period till he gets an opportunity to return to his village.

CHARACTERISTICS OF URBANIZATION

The growth of urbanization and the imposition of a compe-

titive system on a self-subsistent type of production have disturbed the economic isolation of the villages, and created a capitalist system involving a seasonal labour market and the exploitation of the masses. Whilst we have not enjoyed so far the benefits of industrialism to any great extent, we have produced in our cities all the evils associated with overcrowding, slums and unemployment. In cities housing and working conditions, recreation facilities and sanitary conveniences have all been incredibly bad, and food has been scarce and unwholesome.²² An analysis of census returns throws some light on this problem, though it does not reveal the whole picture. The outstanding facts are:

(1) Some of the cities have greater densities than is known even in the heavy industrial countries of the world, e.g., in 1931 Bombay had 48,400 persons per sq. mile, and Calcutta 24,400, Madras 22,300, Jaipur 48,100 and Amritsar 24,000 persons per sq. mile as against only 24,900 persons per sq. mile in New York, 16,400 in Chicago, and 15,100 in Philadelphia in 1940.

(2) These densities are achieved despite an absence of tall buildings, for the bulk of population live in houses of one or two stories. Most of the tenements contain only one room with one or more families living huddled together in this space despite the fact that the size of these tenements is normally between 10×10 and 12×15 feet.²³ If an average of $2\frac{1}{2}$ persons per room be taken as an indication of overcrowding, then houses sheltering 96 per cent of the population of Bombay will be considered to be overcrowded and this population is housed so inadequately that the streets have to be used to supplement the sleeping accommodation. In fact, overcrowding is so great in Bombay that men have to sleep out wherever possible and during the monsoon, when it is impossible to lie on the pavement, varandahs, alley-ways and stairs are all crowded with persons sleeping there.²⁴ Certain sections of Bombay show the worst form of overcrowding. Byculla with 99 per cent of the families living in single-room tenements, Sewri with 89 per cent, Mazagaon and Parel with 88 per cent and Second Nagbada with 87 per cent are the worst examples. The extent to which the slums have been created in India by the process of urbanization may be illustrated by the 1931 figures of congestion in Bombay city, Kanpur and Lucknow:

23 *Census of India*, Vol. I, Pt. I, p. 57.

24 *Census of India*, 1931, Vol. I, Pt. I, p. 57.

Cities		1 Room	2 Rooms	3 Rooms	4 Rooms	5 Rooms
		Tene- ment	Tene- ment	Tene- ment	Tene- ment	Tene- ment
Bombay	.. ..	81	11	3	2	3
Kanpur	.. ..	62.5	24.8	7.5	2.9	2.3
Lucknow	.. ..	50.4	28.9	10.7	5.2	4.8

The census publishes figures of an average number of persons per house. The figures of one census are not strictly comparable to those of another, because of changing definition.²⁵

The average number of persons per house was 5.8 in 1881. It was 5.4 in 1891, 5.2 in 1901 and 4.09 in 1911. The figures have been more or less constant up to 1921 after which there appears to have been an increase in the number of persons per house. The figures were 4.9 in 1921; 5.0 in 1931; 5.1 in 1941 and 5.8 in 1951. This shows that the number of houses is not increasing as fast as the number of people. The condition of housing has become acute. It has worsened during the past few years due to increasing population influx of refugees from Pakistan and a slowing down of the construction of new houses because of high prices of land, steel and building materials.

The Planning Commission has made a rough estimate of housing shortage in industrial towns by collecting information from 37 towns with a total population of 1½ million working in large-scale industries. It has come to the conclusion that there is an immediate need of housing accommodation for 4½ lakh industrial workers. According to another estimate there is a shortage of 18½ lakh houses in urban areas in addition to 10 lakh houses for displaced persons from Pakistan. Whatever may be the actual extent of the shortage, there is no doubt that there is acute shortage of housing accommodation.

The houses are not only scarce but the housing conditions are appalling both in the cities and the rural areas. The single-room ramshackle *bustees*, *ahatas*, *chawls*, *cherries* and *dowras*

²⁵ Census of 1921 says, "Formerly a house was defined as the residence of one or more family having a separate independent entrance from the common way. But now it has been defined as the home of commensal family with its resident dependents and servants." (p. 46). This definition, though used in 1931, could not be applied universally in all parts of India, because of variation in family customs and reference to food and residence.

The 1951 Census attempted to follow a single system throughout the country. It defined a 'house' and a 'household' separately: 'A household' is a group of people who live together and take their food from a common kitchen. Whereas a 'house' is a building within which people live; provided that if different parts of the building is structurally separated and provided with separate main entrances so as to give independent access to each part (Vol. I, Pt. I, p. 48).

have all been built by private landlords and employers. In the busiest centres the houses are built close together, eave touching eave, and frequently back to back in order to use all the available space. Neglect of sanitation is often evident from heaps of rotting garbage and pools of sewage, whilst the absence of latrines increases the general pollution of air and soil. Many of the houses are without plinths, windows and adequate ventilation. They usually consist of a single small room, the only opening being a doorway often too low to enter without stooping. In order to secure some privacy, old kerosene tins and gunny bags are used to form screens which further restrict the entrance of light and air. In dwellings such as these, human beings are born, grow up, sleep and eat, live and and die.²⁶ Though this was written over two decades ago, yet the general features of houses in every industrial centre remain the same. The same sort of overcrowding, congestion, lack of sanitation and ventilation, absence of latrines and water-taps, dark, damp, filthy tenements with little arrangement for privacy are to be met with even now. Cooking and sleeping in the same room are common. The whole thing is awfully disgusting and it is simply surprising how human beings live under such conditions. The same story about appalling housing conditions in Madras, Ahmedabad, Bihar and Kanpur has been repeated by the respective Committees.²⁷

Even with a bare 17 per cent people living in towns, the congestion in some of them is terrible. Rickets in children, and anaemia, dyspepsia and lassitude in grown-up people are characteristic of such houses whose air is vitiated by overcrowding; inhalation of such air results in the lowering of the power of resistance against all maladies in general and phthisis, bronchitis, diptheria, pneumonia, enteric fever, parasitic disease, etc., in particular. These diseases are common in all labour *bustees*. Epidemics also take a heavier toll in cities than in the open countryside. As Mr. Yeats remarked, "This urbanization has all the draw-backs of lack of control and general squalor." Approaches to very big cities like Bombay, Madras or Calcutta, are hideous. Thousands of homeless squatters are found camping in the outskirts. Brick-kilns are another hideous sight. Delhi with its "ribbon development" along with roads going out of the city is an eye-sore. Calcutta is "an octopus with more than eight tentacles." Amritsar presents an ugly, repulsive look.²⁸

The following table shows the density of occupation in

26 *Report of the Royal Commission on Labour, 1931, pp. 271-72.*

27 *Census of India, Vol. 14 (Madras, Pt. I, p. 69); Report of the Royal Commission on Labour, p. 277; The Bihar Labour Enquiry Committee Report (1940), p. 88; and The Kanpur Labour Enquiry Committee Report (1938), p. 78.*

28 Yeats, *Census of India, 1941, Vol. I, Pt. I.*

Madras

			1 Room	2 Room	3 Room	All dwellings
Sugar Mills	..	..	4.9	3.2	2.7	4.2
Tramways	..	..	5.0	2.2	..	4.6
Tanneries	..	..	5.9	3.2	3.0	4.8

Bombay

Employers' Houses ..	4.5	3.2	..	4.4
Private Houses ..	5.8	2.7	..	5.2
Printing Presses ..	4.8	4.3	..	4.7

Kanpur

Employers Houses ..	4.0	3.1	..	3.9
Private Houses ..	3.8	2.4	..	3.2

(3) The absence of adequate housing accommodation has brought in a serious disparity between the proportions of sexes. The costly city life, the absence of work for women and the restrictions on child and female labour reduce the possibility of bringing the family to the city. This makes the city all the more unattractive to the worker as a place of residence and increases the worker's desire to get back to his village home as soon as possible. The sex disparity is most marked in the age groups 25-30 and 30-35. This is responsible for the spread of prostitution and of venereal diseases from the industrial centres to the villages. While the man-worker leading single life comes back to the village tainted and diseased, "the woman workers lose their self-respect and virtue and are looked down by the village population." In the thousands of slums of the Indian industrial centres, manhood is, unquestionably, brutalised, womanhood dishonoured, and childhood poisoned at its very source.³⁰ The following table gives sex ratio of the towns and cities:³¹

Sex Ratio in the Towns and Cities, 1881-1941

<i>Class of towns</i>	1881	1891	1901	1911	1921	1931	1941
Persons ..	110	110	111	111	113	118	N. a.
1,000 to 10,000	105	104	105	107	108	111	N. a.

29 Summarised from *Rege Committee's Report*, Table 137, p. 313.

30 R. K. Mukerjee, *The Indian Working Class* (1951), p. 320.

31 From *Census of India*, 1891, 1901, 1931, 1941.

10,000 to 20,000	105	106	106	108	110	113	N. a.
20,000 to 50,000	106	109	110	115	121	121	N. a.
50,000 to 100,000	111	114	111	118	120	120	N. a.
100,000 to 500,000	111	115	116	122	131	128	127
500,000 and over	162	178	156	171	175	173	161

Although India has been traditionally rural, there are undeniable evidences that a change is coming on. The acceleration in the growth of cities, the trend towards industrial and commercial expansion, the potential development of females in the urban industrial centres and the consequent normalisation of the sex ratio, all point to the fact that urbanization in India is likely to gain momentum as it goes forward, and that within the coming decades the pace may become extremely rapid.

But in India, we do not advocate piling up of people in big cities, blindly following the West. We are anxious not to repeat the mistakes of the West. We should have a scientifically planned development of our cities so that all evils associated with congested areas are prevented from appearing. Scientific town-planning would mean the equitable distribution of the available land according to the various needs of the community including the provision for residential and industrial areas, space for broad thoroughfares, dustless macadamised tar roads, and avenues, gardens, parks and pools and civic amenities like a protected water supply, hygienic sewage disposal and adequate lighting. For future we should have medium-sized, open, airy and healthy towns. What is needed is the urbanization of the rural and ruralisation of the urban centres.

سید شمس الدربانی
عالمگیر خانپارہ شکر

CHAPTER 14

DISTRIBUTION OF POPULATION

Introduction. The study of the distribution and density of population over the face of the earth constitutes one of the fundamentals of Human Geography. Population distribution over a region is intimately related to its ecology and is reflected in the economic and social life of that region. There is a delicate ecological equilibrium between the environmental conditions and the pattern of population, which often breaks down resulting in the lowering of standard of living, emigration or even warfare. The fundamental objective of Human Ecology lies in the elucidation of geographic control on population disparities over the earth and in the analysis of the conditions responsible for such local or regional anomalies.

Distribution of Population in the Face of the Earth. The United Nations Organisation estimates that on the earth's 55 million square miles of land there are 2,500 million persons. About 10 million square miles of the land area is covered by ice and snow or is too wet or too dry for habitation and about half of the remaining 45 million square miles is very sparsely settled. This leaves about 22.5 million square miles to support most of the human population. On this area the population is not equally distributed. The statistical study of the world's population strikingly reveals that over three-quarters of the earth's inhabitants are concentrated in two or three great continental clusters. One of these is in the south-eastern Asia or Monsoonia, a second is in Central and Western Europe and a third, which is considerably smaller than the other two, is in eastern and central U.S.A. and Canada. At the opposite extreme from the three great continental clusters of dense population are the lands of the earth that are relatively empty of people. The largest single empty spots are in the lands bordering the Arctic Ocean (where shortness of growing season, cool summers with frost hazard and miserable soils are principal physical handicaps). At the opposite climatic extreme are somewhat less thinly peopled Wet Tropics, more especially the forest lands. The third type is thinly peopled areas in the dry lands. Table 13 shows the distribution and density of population in the continents and some of the important countries of the world¹:—

1 *Demographic Year Book 1953 & World Facts and Figures* (U.N.O.) 1953, p. 2-3.

Continents	Population in 000's		Area (1000 sq. miles)	Density per sq Kil.	Density per sq. mile (1947)
Asia (Ex. U. S. S. R.)	1,243,000	1,346,000	27,030	46—50	131.5
Europe (do.) ..	394,000	398,000	4,920	80—81	193.4
Africa	191,000	208,000	30,292	6—7	0.5
N. & S. America ..	321,000	341,000	42,043	8	17.9
Oceania	13,100	13,500	8,557	2	1.5
World	2,376,000	2,499,000	135,112	2	..
<i>Countries :</i>					
U. S. S. R. (1946 estimates).	..	193,000	22,271	9	22.5
India .. ..	..	356,829	3,288	117	281. (1951)
China .. ..	..	463,500	9,736	48	128.3
Japan .. ..	..	84,300	368	229	543.9
Indonesia .. ..	..	76,500	1,492	51	..
Pakistan .. ..	..	75,842	948	80	..
U. K. .. ..	..	50,558	244	207	525.8
Netherlands ..	..	10,264	32	317	..
France .. ..	..	42,239	551	77	194.8
Italy .. ..	..	40,598	301	155	390.3
Germany .. ..	..	60,000	353	195	..
Australia .. ..	..	8,431	7,704	1	3.9
New Zealand ..	..	1,047	268	7	17.4
U. S. A. .. ..	..	154,353	7,828	20	47.7
Canada .. ..	..	14,000	9,960	1	3.4
Brazil .. ..	..	53,377	8,516	6	14.5
Mexico .. ..	..	26,332	1,969	13	1.
Egypt .. ..	..	20,729	1,000	21	51.8
Union of S. Africa ..	..	12,683	1,224	10	34.6

According to the density of population the countries of the world may be arranged in the following groups:—

(i) Countries having density of population between 1 and 5 persons per sq. Km—Australia and Canada.

(ii) Countries having density between 6 to 20 persons per sq. Km. Brazil, Mexico, Union of S. Africa, New Zealand.

(iii) Countries having density between 21 to 155 persons per sq. Km.—Egypt, France, China, India and Italy.

(iv) Countries having density between 156 to 230 persons per sq. Km.—U.K. and Japan.

The most significant and startling fact emerging from the above table is that more than half of the world's population is crisscrossed, cabined and confined in about 1/20th of the total land area. Secondly, that Asia has the most people with 46-50 persons per sq. Km. Next comes Europe with lesser number of people than Asia but has 80-81 persons per sq. Km. North America comes third in order of population and has 8 persons per sq. Km.—Africa comes fourth with 6-7 persons per sq. Km. followed by Oceania—with only 2 persons per sq. Km. which is the most thinly populated region.

Thirdly, it is peculiar to note that India occupies unique position as regards the size of her contribution to world population. She has got about 2.3% of the world's area, but she maintains 14.3% of the world's population whereas Asia has an area of about one-fifth of the surface of the globe and a population roughly 50% of the world population. African has got a little less than one-fifth of the land area of the world with one-twelfth of the total population. North America approximates Africa both with regard to area and population. Europe on the other hand has 1/27th of the total land surface with one-sixth of world's population, while Oceania with approximately double the area has only 0.5% of the world's population.

Fourthly, a closer analysis reveals that the most densely populated areas of the world are China, India, Japan, Indonesia, Germany, U.K., France, Belgium, Italy and Netherlands. In contrast to these regions vast territories having thinly settled populations are situated mainly in the central regions of the continents. These thinly populated areas include Siberia, parts of Central Africa, and S. America—Central and Northern parts of North America, parts of Australia and many islands in the Pacific, Canada, U.S.S.R., U.S.A., Brazil and Argentina, etc.

It is obvious that the uneven distribution of population in relation to land area and its inherent resources presents a formidable problem of economic differential with all its attendant international strains and tensions.

The disparity in the distribution of population in the world is largely to be traced to the physiographic factors and to the factors of geographical environment and social factors which have been discussed in the later section below.

In Asia. Within the Monsoon lands of south-eastern Asia, which support such a large percentage of the world's people, the spread of population is very uneven. Here it is a much fragmented or clustered pattern that is conspicuous, with a relatively small part of the total land area supporting a great majority of the people. Almost knife-edge boundaries frequently appear to separate areas containing several hundred, or even thousand persons per square mile from others which are almost barren of settlement. This markedly clustered pattern of population is closely associated with surface configuration and soil characteristics, for south-eastern Asia is, in general, a hilly region with restricted lowlands composed of river alluvium. The peasant farmers have tended to gravitate towards these alluvial lowlands, where soils are fertile and gentle slopes and abundant water (two items relatively necessary for the inundated rice crop) are easily available. One might with great fitness describe Japan and China as having "alluvial civilization".

Over dry central and western Asia population is concentrated in or near the highlands where water is more abundant. In Siberia there is a marked focusing of the agricultural population on the east-west belt of fertile dark soils between Taiga region and the drylands of Aral-Caspian region, to the south.

In Europe. In western Europe as well, even on the lowlands, the clustered population pattern is conspicuous. This is particularly true in Great Britain where more than 80% of the population is classed as urban. Here six of the seven most conspicuous population clusters are industrial urban concentrations coincident with important coalfields. On the continent of Europe there is a continuous belt of extremely dense population oriented east-west along the 50th parallel from the North Sea and English Channel to the lower Dnieper in Soviet Russia. This might be called the "European population axis". The belt broadens from east to west and the density of population likewise increases in the same direction. It reaches its greatest density in the vicinity of the lower Rhine, coincident with important coal and iron deposits and lying near the mouth of one of the world's greatest waterways. This maximum concentration of people in the general region of north-western Germany, Holland, Belgium, and northern France is continued eastward in somewhat less intense form through southern and eastern Germany; northern Bohemia and Moravia in Czechoslovakia, Galicia in southern Poland and into the Ukraine of southern Soviet Union. Throughout the length of the European population axis (which contains more than a fourth of the people of the continent) lie the most important coal basin of Europe.

In the Mediterranean Europe high population densities are found on a number of small isolated basins or delta plains, but

these populations are based chiefly upon agriculture, Chief among these islands of population is the one occupying the large and relatively fertile Po valley in Italy. Here both rural and urban population are represented, for this is Italy's most highly industrialised region. It thus becomes obvious that, although eastern Asia's population concentrations are of peasant agricultural people focussed upon fertile alluvial plains, to a much larger degree western and central Europe's population is concentrated in commercial and industrial towns and cities grouped with respect to basic mineral resources, important routes of trade or fertile plains producing raw materials and food.

In N. America. In the United States the most striking feature of population distribution is the contrast between the well occupied humid East with its predominance of lowlands, and the meagrely occupied dry and rougher West. Throughout the lowlands of much of central and eastern U.S.A. population is spread rather evenly, and marked clustering is not conspicuous. It is chiefly in the north-eastern part of the country which includes the great manufactural belt with its large urban population, that clustering is prominent. West of the Appalachians the highest densities are coincident with the industrial belts along (a) the southern and southwestern sides of Lake Michigan, (b) the southern side of Lake Erie, (c) the margins of Lake Ontario and the Mohawk valley, and (d) the upper Ohio valley in western Pennsylvania and eastern Ohio with Pittsburgh as the principal centre. East of the Appalachians is the single greatest continuous belt of dense population which is coincident with the country's greatest manufacturing concentration stretching along the Atlantic Seaboard from southern Maine to Maryland. Rural farm population is highest in the south, where the two principal crops (cotton and corn) require large amounts of human and animal labour.

West of the 100th meridian or thereabouts, population not only becomes less dense but it is much less evenly spread than over the humid Mississippi valley. In this drier and usually more rugged country population is chiefly clustered along river valleys, where irrigation water is available, and around important mining areas. In the humid Pacific Coast states with their prevalence of highland, clustering is still very prominent.

In Tropical and S. America. In tropical Latin America population is concentrated in the cooler uplands. Nearly two-thirds of Mexico's people live in the higher, cooler and more humid southern portion of that country's central plateau.

Throughout South America in general people occupy chiefly the margins of the continent. In part this reflects (a) the physical (chiefly climatic) handicaps of the Interior lands and (b) the use of the ocean as the chief highway.

In Australia. Australia's population is likewise marginal in location and chiefly along the subtropical southeastern seaboard. Much of the interior and western Australia is too dry for agricultural land use, and the humid tropical climate of the northern part has likewise been a deterrent to settlement.

In Africa. In Africa, concentrations are conspicuous (a) along the Mediterranean boarderlands, (b) in the western Sudan and along the Cuinea coast, (c) on the East African uplands including the Abyssynian plateau, and (d) along the southern and southeastern margins of the continent. Most striking of all, however, is the unusual concentration on the flood plains and delta of the Nile in Egypt, where the population density reaches 1500 per square mile while the bordering lands are nearly empty of people.

Distribution in India. Coming to our own country we find that the distribution of population is very uneven. According to zonal classification, Northern India with the single state of U.P. has a population of 63.2 million (or 18% of the total). Eastern India covering Bihar, Orissa, West Bengal, Assam, Manipur, Tripura and Sikkim, has 90 million or (25%) Southern India covering Mysore, Madras, Travancore-Cochin and Coorg has 75.6 million (or 21%); Western India covering Bombay, Saurashtra and Kutch has 40.7 million (or 11%); Central India comprising of M.P., M.B., Hyderabad, Bhopal and V.P. has 52.3 million (or 15%) and North-west India covering Rajasthan, Punjab, PEPSU, Ajmer, Delhi, Bilaspur and Himachal Pradesh has a population of 35 million (or 10%).

If we consider the regional distribution of population the Northern plains contain 39.1% of the total population; the Peninsula Hill and the Plateau region contain 30.4%; the Eastern Ghats and the Coastal areas 14.5%; the Western Ghats and the Coastal areas 11.2% and the Himalayan region 4.8% of the total population. This shows that the fertile plains and the productive areas of the country have a greater proportion of the country's population.

From the point of view of population, U.P. with 63 millions, heads the list followed by Madras with 57 million, and Bihar 40 million which occupy second and third positions respectively. Barring Vindhya Pradesh (3.57 million) and Delhi (1.74 million), none of the Part C States and Part D states have a population of more than a million, the number of inhabitants in Andaman islands being only 30,971.

Density of Population. The relationship of number of men to area of land is called the 'manland ratio' which in simplest form may be expressed as the number of persons per square mile,

square kilometer of some other unit of area. This is sometimes known as the 'Simple arithmetic density' of population. In 1951, the earth's population was estimated to be 2,499 million, which expressed in terms of man-land ratio, was a little over 18 persons per square kilometer or 45 persons per square mile. But quite obviously, this figure gives no genuine understanding of real density, for it fails to take into consideration the fact that over 70% of our planet's surface is water, which has no permanent settlements. For the land areas of the earth only, the population density is slightly over 41 persons per square mile. This, to be sure, is a more refined and accurate figure than the former, but still it fails to give a very true picture of the actual conditions since human life is by no means evenly distributed over the Continents. Arithmetic density of population for some important countries is (per square mile)²:—

Russia 23; U.S.A. 50; Java and Madura 818; China 123; Pakistan 208; Italy 399; England and Wales 794; Japan; Belgium 734; Netherlands 826; Australia 3; Canada 4; Germany 505; India 281.

It may be pointed out that mere numbers supported per square mile of land have small significance unless we also take into account the standard of comfort of population in question. The density of India is a high average density but it is by no means the highest. It falls considerably under that of England and Wales, Germany, Netherlands, Italy, Belgium, Java and Japan. Thus the region as a whole is not more thickly settled than any western or even some of the Eastern countries as is sometimes thought. For the sake of correctness, however, and this is the truth in the assumption that the density is high—the region should not have its overall density compared with that of the areas more similar in size such as Brazil, the U.S.A., China, Canada and Australia. When this is done it is found that India does have an unusually high density. It has an overall density greater than that of the any other political entity of equal or greater in size in the world. Its figure of 281 per square mile exceeds that of U.S.A., by about six times, and that of China by a little less than three times and of Brazil by twenty-one times.

It is not possible to draw inferences about economic position from average density. For example, England and Wales has about the same density as West Bengal, but is comparatively the richer of the two. On the other hand, there is great difference as regards density between U.S.A. on the one hand, and England and Wales, on the other, which does not present, the two count-

² Density figures calculated from *International Year Book and Statement Who's Who* (London 1951), pp. 11, 54, 76, 220, 286, 366, 378 & 464.

ries from being on a par as regards their economic position. If a country is densely populated it does not necessarily follow that it must be prosperous. The same density does not indicate the same level of economic prosperity. U.S.A., the richest country in the world—has got a very low density. Australians are fairly rich, yet their density is as low as 3 per square mile. The U.K. with high density and U.S.A. with low density enjoy a high standard of prosperity.

Even in regions where human beings are widely and evenly dispersed the man-land ratio does not give an accurate measure of real density. This is because equal areas vary greatly in their capacities or resources for supporting population. The index of population density can be accurate if it can be shown per square mile of productive land of an area. The productivity of land depends on climate, configuration, soil, vegetation and mineral resources. This density is known as 'general economic density' of population. Of somewhat greater significance than arithmetic density of population is the so-called 'physiological density' which substitutes arable land for total area in the man-land ratio. This is more refined and accurate index of population density because it omits those lands that are unproductive. In India the density of population per square mile of arable land is about 400, and for China the figure is lower probably between 300 and 350. For Indonesia it is much lower, while Denmark has a physiological density of about 500 persons, per square mile of arable land; Europe excluding U.S.S.R. has 321 persons, U.S.A. and Canada, about 77 persons, Latin America 24 persons, Africa 35 persons, Oceania 3 persons, Middle East 456 persons and South East Asia 330 persons per square mile of cultivable land. In this connection Prof. Colin Clark has pointed out that 200 people can be fed on Danish standard per square kilometer of cultivable land or 500 persons per sq. mile. On this standard the other countries of the world cannot be said to have a heavy pressure of people on land; and according to the Danish standard countries like Japan, Belgium and Netherlands probably could be said to have great pressure on land. The Federal Republic of Germany is just on the borderline, but though India supports about 400 persons per sq. mile of arable land, she is not above the Danish limit. In countries like Belgium, Germany, and Britain the population is not solely dependent on its limited land area for its support but is also engaged in export industries and, hence, even though the pressure on land seems to be higher but the situation is not alarming.

In Europe excluding U.S.S.R. which has 14 million sq. mile of cultivable land and supports about 450 million people—95% of whom derive their maintainance from agricultural production. If all of Europe were as densely settled as Denmark, 700 million

people would be able to obtain their food supplies from this area. But U.S.A. and Canada, can feed only a small number of people even on European standards of cultivation. South-east Asia, apart from Indonesia, is also lightly populated where large areas in Burma, Thailand and Malaya remain uninhabited. Therefore, most of the world is populated at far below its potential density—not to say of India. The world's total area of cultivable land is about 24 million sq. miles and at Danish standards of cultivation and consumption it could support 12,000 million people, as opposed to 2,300 million people it supports now.³ And we might say that India's density of population is though high, but not above the Danish limits, and it can maintain even a greater population on its land provided intensive cultivation of land is resorted to.

Prof. Clark supplies the table given on p. 260 which gives the number of persons engaged in agriculture per sq. kilometer of cultivable land, i.e., the density of agricultural population.⁴

A glance at this table reveals that there seems to be little connection between density of settlement and average product per head, e.g., the same density of settlement prevails in Denmark, as in U.S.S.R., Germany, Spain and Turkey, but the product per man is five times in Denmark than that in U.S.S.R. & Turkey and about twice as much as that of India. No doubt the agricultural density in India is high like that of Italy, but the methods of cultivation are quite out of date barring a small use of modern methods—whereas in Italy the farming methods are much better, and hence the low agricultural production per head in India. The highest product per head is to be found in Denmark closely followed by Netherlands and Britain. In Denmark the high product is obtained with a density of settlement of 10 men engaged in agricultural work per square kilometer of cultivable land and in Netherlands with 17.

³ Colin Clark, *Population Growth and Living Standards*, *International Labour Review*, Vol. LXVIII (August 1953), p. 10.

⁴ Colin Clark, *Op. Cit.*, p. 6.

Relation between the Intensiveness of Cultivation and Agricultural Output per person engaged in Cultivation

Vale of agricultural production per engaged person. (Rs. per year)	Number of persons engaged in agriculture per square kilometer of cultivated land					
	0—5	5—10	10—15	15—20	20—25	25—30
Below 1,000	..	Philippines ..	..	..	..	India
1,000 to 1,500	Turkey ..	..	..	..
			U. S. S. R. Yugoslavia			
1,500 to 2,000	Poland ..	Rumania ..	..	Italy
2,000 to 2,500	..	Brazil ..	Greece ..	Cyprus ..	Portugal ..	..
				Bulgaria		
2,500 to 3,000	France ..	Spain ..	Hungary	..
2,000 to 3,500	..	Sweden ..	Australia. Ireland ..	Syria ..	..	..
3,500 to 4,000	Germany ..	Belgium ..	..
4,000 to 4,500	Czechoslovakia	..	..
4,500 to 5,000	Britain ..	..	Netherlands	..
5,000 to over	Denmark ..	..	..	..

(A few countries of Europe belonging to highest income group and others like U.S.A., Australia and Argentina have been left out from this table for there is no shortage of land in them).

Density of Population in India. The following table gives the spatial distribution in India.⁵

State and Union Territory	Geographical area (sq. miles)	Population in 1951 ('000)	Density of population per sq. mile
<i>States:</i>			
Andhra	105,677	31,253	296
Assam	85,012	9,044	106
Bihar	66,161	38,355	580
Bombay	191,367	48,272	252
Kerala	14,601	13,544	928
Madhya Pradesh	170,909	26,102	153
Madras	50,171	29,980	598
Mysore	74,093	19,401	262
Orissa	60,135	14,646	244
Punjab	47,427	16,135	340
Rajasthan	132,439	15,940	120
U.P.	113,433	63,216	557
West Bengal	34,944	26,681	764
J & K	92,780	4,401	48
<i>Union Territories:</i>			
Delhi	578	1,744	3,017
H.P.	10,909	1,109	104
Manipur	8,622	578	67
Tripura	4,032	639	158
Andamans	3,215	31	10
Laccadives	384	21	55
Total India	1,266,890	361,101	285

⁵ North-East Frontier Agency has been formed a separate union territory on first December, 1957 and it no longer remains a part of Assam, its density being 47 per sq. mile.

From the above table it would be inferred that the average density of population in India is 281 per sq. mile. It varies considerably from State to State, being as high as 3,017 in Delhi and

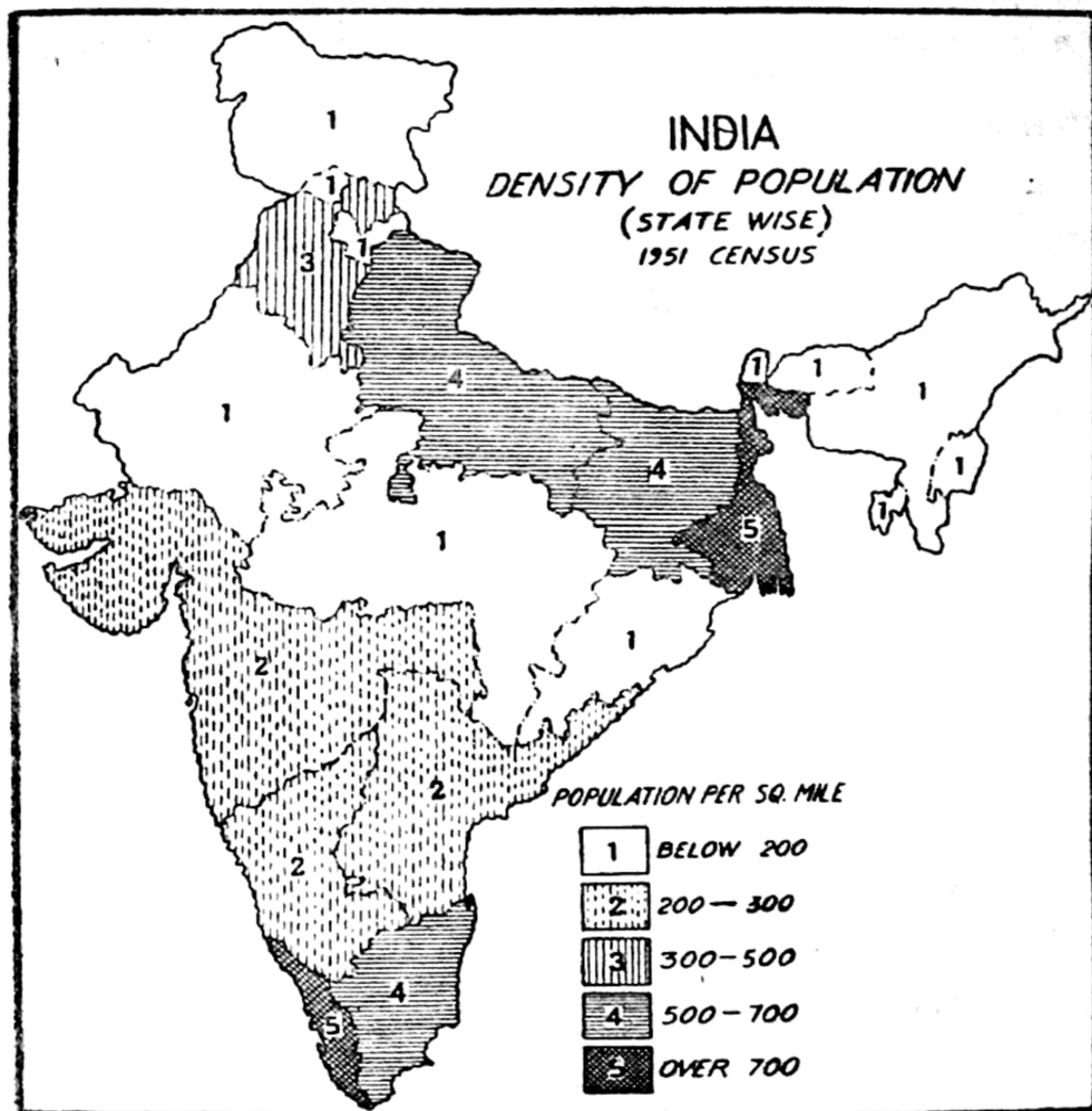


Fig. 37

928 in Kerala and dropping as low as 10 in Andaman and Nicobar Islands and 48 in Kashmir. Between these figures lie the states of West Bengal with 764 persons per sq. mile, Madras 598, Bihar 580, Bombay 252 and Orissa 244 persons per sq. mile. On the basis of the table the states may be arranged in the following groups to show the density of population in the country:—

(i) *Very Sparsely populated areas.* These areas have a very low density, i.e., below 125 persons per sq. mile of land area. Such areas consist of Rajasthan, Himachal Pradesh, Jammu and Kashmir, Manipur and Assam.

(ii) *Sparsely populated areas.* The density of population in these areas ranges from 126 to 250 persons per sq. mile. These areas comprise of Madhya Pradesh, Orissa and Tripura.

(iii) *Moderately populated areas.* These areas enjoy a moderate density of population ranging from 251 to 500 persons per sq. mile. Such areas are Punjab, Bombay, Andhra and Mysore.

(iv) *Heavily populated areas.* The density of population in these areas rises over 501 to 700 persons per sq. mile. Such areas are U.P., Bihar, and Madras.

(v) *Very densely populated areas.* These areas are Kerala, W. Bengal and Delhi. They enjoy a density of population over 700 persons per sq. mile.

Approximately one-half of the people of India live on rather less than one-quarter of Indian land. The Census of India 1951 provides us⁶ with the following areas of high, medium and low density-sub-regions.

Sub Region	Land Area (Lakh acres)	Population (In Lakhs)	Density per sq. mile.
<i>High Density Areas.</i>			
Lower Ganges Plains	538	700	832
Upper " "	366	389	681
Malabar Konkan	239	238	638
South Madras	355	307	554
N. Madras & Orissa Coastal	1293	211	461
Total	1791	1845	660.
<i>Medium Density Areas.</i>			
Trans-Gangetic Plain	499	259	332
South Deccan	817	315	247
North Deccan	621	239	246
Gujrat Saurashtra	456	161	226
Total	2393	974	260

⁶ *Census of India, 1951, Vol. I, Pt. I-A, pp. 13, 20 and 28.*

Low Density Areas:

The Desert	482	46	61
W. Himalayas	852	90	68
E. Himalayas	674	124	118
N. W. Hills	409	104	163
N. Central Hills & Plateau	537	138	164
North East Plateau	967	290	192
Total	3921	792	129

It will be seen that (i) 22 % of the land area supports 50.1 % of the population, (ii) another 48.3 % land supports 21.9 %, (iii) 29.4 % land supports 27 % and (iv) 0.3 % of land supports 1 % of the total population.

Trends of Population Density in India. The following Table gives the growth of density and percentage variations in India and the Provinces since 1872.⁷

				India		Provinces	
Decade				Average Density	Variation percentage (In +)	Average Density	Variation percentage (In +)
1872-81	..	..	..	141	23.2	182	7.
1881-91	..	..	..	159	13.2	202	11.2
1891-1901	..	..	..	179	2.5	254	4.7
1901-11	..	..	..	191	6.7	267	5.0
1911-21	..	..	..	193	0.9	269	0.8
1921-31	..	..	..	213	10.6	296	9.9
1931-41	..	..	..	246	15.0	341	15.2
1941-51	..	..	..	281	14.2	N. A.	N. A.

Certain important observations may be made regarding the trends of density in India:—

1. The density of population for the country as a whole has shown a great variation in last 80 years. It has shown a percentage variation of 147 between 1872 and 1951 census periods.

⁷ *Census of India, 1911 Vol. I, Pt. I, p. 84 and for 1941 p. 69, for 1931 figures calculated from the Census paper No. 1.*

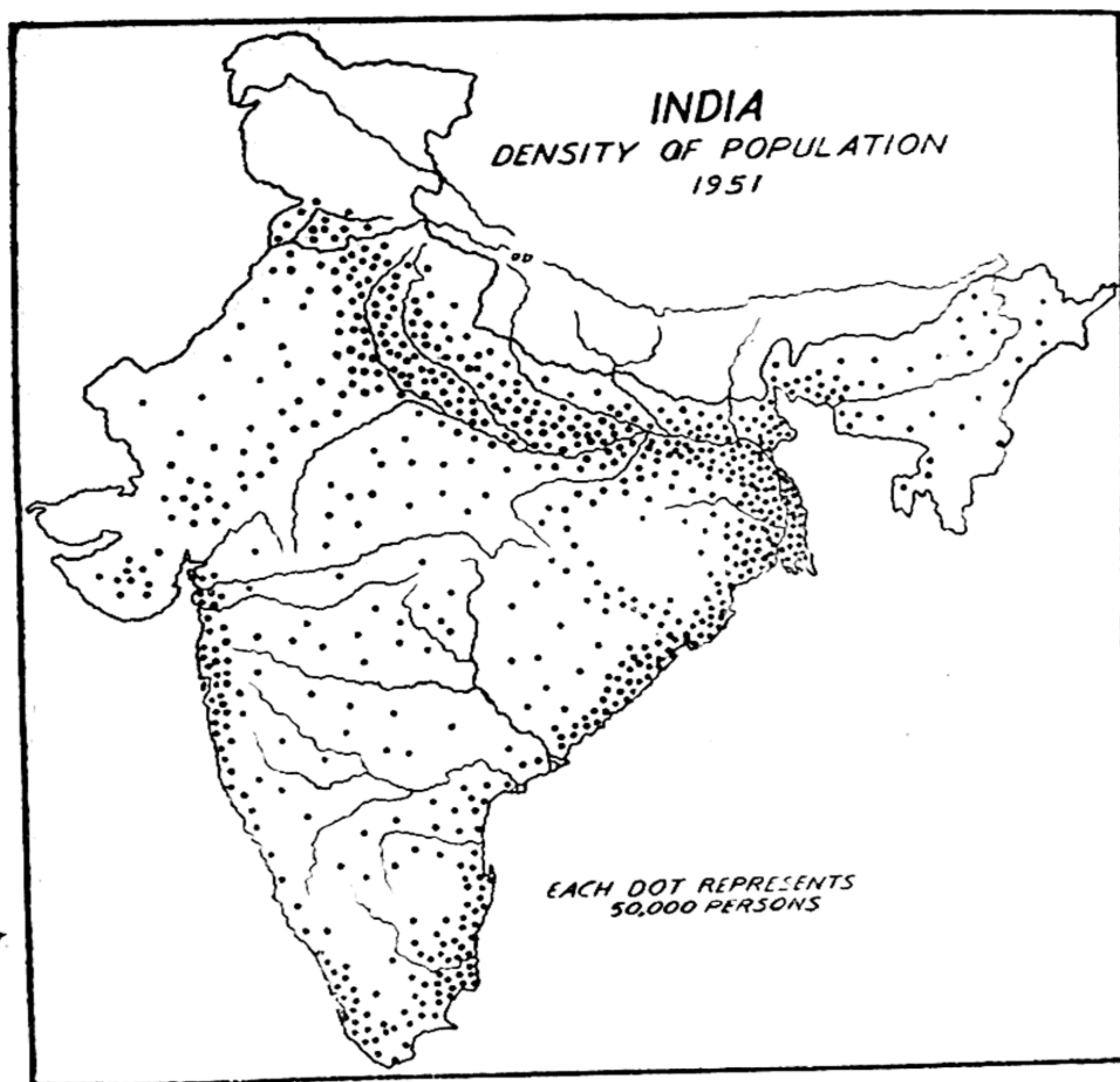


Fig. 38

2. The average density of population per sq. mile of land has been increasing not only for the whole of India but also for the individual states, e.g., in Madras it has increased from 219 to 594 (a percentage increase of 171.2) between 1872-1951; in Bombay from 132 to 323 (an increase of 144.6% during the same period); in West Bengal from 434 to 806 (85.9%); in Bihar from 318 to 572 (79.8%) during the same period.

This increase is attributable to the increase in area under irrigation due to the development of various irrigation works in the country (specially in E. Punjab, West U.P. and Madras) as well as the improvement in the means of transport in the country which threw open vast areas for habitation and contact. The stable Government is also responsible for the security of life and property of the masses leading to congregation of persons in large numbers in the fertile lands.

3. The percentage variation in the density of population has fallen from 13.2 in 1881-91 to 2.5 in 1891-1901, because of the severe famine that visited the country during this period and the scarcity conditions that existed then over considerable areas in Madras, Bombay and Bihar. The percentage variation rose to 6.7 in 1901-11 during which period the agricultural conditions were much more favourable than the earlier decade and although there was no famine of severe type yet the plague was continuing to take even a heavier toll. It fell to 0.9 in 1911-21. This sharp decrease is due to the occurrence of influenza epidemic and its aftermath. Since 1921-31 it has been increasing due to better conditions of harvest, development of means of transport and improvement in the medical facilities in the distant parts of the country.

In 1911 too, there was a great local variation in density. In nearly two-third of the area the number of persons to the square mile was less than 200, and in about one-fourth it ranged from 200 to 500. The units with less than 100 persons to the sq. mile covered two-fifths of the total area but contained only one-eleventh of the whole, containing one-third of the population. The average density in 1911 was 191.⁸

In 1921, the density per sq. mile was 193. About one-third of the total population occupied rather more than two-thirds of the area at a density below the mean of the country; while one-sixth of the area was occupied by nearly half of the population at a density of over 350.⁹

In 1931, the density per sq. mile was 213 but it was not equally distributed. In 1941, about a third of the area supported a little less than three-fourth of the population with a density above 246 and about one-fifth of the area had the density over 500 persons to a square mile. The density per sq. mile was 246.¹⁰

In 1951, a little less than one-third (28%) of the land had a density below 250 persons per sq. mile, while another less than a third of the land (27%) had a density of below 500 persons per sq. mile and the remaining about half (45%) of the land area supported a density of over 500 persons. The average density for the country was 281.¹¹

⁸ *Census of India, 1911* Vol. I, Pt. I, p. 13.

⁹ *Ibid.*, for 1921, Vol. I, Pt. I, p. 5.

¹⁰ Davis, *Population of India and Pakistan*, p. 21.

¹¹ *Census of India, 1951*, Vol. I, Pt. I-A.

FACTORS AFFECTING DISTRIBUTION OF POPULATION

There are several factors responsible for the great variation in the density of population over the face of the globe. All the factors which more or less control the unequal habitability over the world's as well as India's surface can be conveniently studied under two heads:—

(i) Geographical factors.—like (a) Climate, (b) Availability of water supply, (c) Physiographic relief, (d) Natural fertility, (e) Nature of crop cultivated, (f) Availability of sources of power and mineral resources and (g) Geographic location.

(ii) Non-Geographic factors.—like (a) Social traditions and (b) Political forces.

1. GEOGRAPHIC FACTORS

(a) *Climate*. The climatic factor is of fundamental importance which determines the spatial distribution of population. Climate is a great dictator of human settlement. It is one of the basic facts of human geography that the fullest and best development of humanity is confined to regions lying between the extremes of rainfall.¹² The great centres of dense population are located in these intermediate zones. As La Blache says, "The distribution of early centres of dense population seems to be confined, approximately, to a zone bounded by the Tropic of Cancer and the fortieth parallel of latitude."¹³ Here "the climate is warm enough, so that many plants can quickly complete their cycle of growth and take advantage of the interval between periods of seasonal rainfall or river floods. Fresh water in the form of springs, lakes, underground water of streams, collaborates with tropical or sub-tropical climates. The great rivers, in particular, descending from the high Asian massifs and fed by seasonal rainfall not only bring waters impregnated with soluble substances, but also they deposit much alluvial material. One is most tempted to guess that in the beginning the largest human settlements must have been located in the section of the lower valley where the overburdened stream succeeded in depositing its load and where the climate is neither too hot nor too cold or too humid or too dry and had neither a paucity nor an excess of rainfall."¹⁴ Surely, the desert sub-region consisting of the districts of

¹² Brunhes, *Human Geography*, p. 67.

¹³ P. Vadal de La Blache, *Principles of Human Geography*, p. 75.

¹⁴ *Ibid.*, pp. 75-76.

Ganganagar, Bikaner, Churu, Jodhpur, Barmer, Jalore, Pali, Nagore and Jaiselmer and the two Western and Eastern Himalayan sub-regions consisting of entire state of Jammu and Kashmir, Kangra and Simla districts of Punjab; Himachal Pradesh, Bilaspur and districts of Garhwal, Nainital, Almora and Dehradun with meagre density of population ranging from 6 persons per sq. mile in the Eastern Himalayan region to 21 in Western Himalayan and 12 in Desert Region—are all due to the debilitating, benumbing and hostile climates—either too dry and hot or too cold and rainy—that render human life intolerable and unsecure.

Similarly the dry deserts of the world are very sparsely populated, except in those fortunate cases where water from some steady source may be obtained. It has been truly said, "The deserts are the gaps in the world's civilisation." Those dry deserts which are least habitable not only for the lack of water supply but in main due to the extremely hot climate which makes living difficult include the Sahara, Arabia, and Central Australia. Again, because of their climatic conditions, the glaciated regions, high rugged mountains and very elevated plateaus are the part of the earth inimical to human existence.

On the other hand, in sub-tropical lands and in the regions like Lower and Upper Gangetic plain (including the States of U. P. Bihar and West Bengal) which have moderately warm and rainy season of four-five months' duration following a winter of moderate cold and precipitation, make it possible for two cycles of plant life to be completed in a solar year with the prospects of two harvests—Rabi and Kharif—and a guarantee against the nightmare of frequent famines and this is perhaps the most propitious environmental condition which stimulates vigorous growth and concentration of settlement in these regions. The Gangetic plains have been over-saturated with teeming population since the earliest times in history. Besides this the temperate marine climate of north-western Europe and humid Continental climate of Eastern U. S. A., with their stimulating and invigorating effects on the physiological and mental framework of man, are among climates *per excellence* the best ones for maximum concentration of human settlements. Thus Belgium supports over 734 persons per sq. mile of land, England and Wales 526 and Germany 490 per sq. mile. Huntington's contention that the lands of highest material culture and civilization coincide remarkably with the zones of maximum climatic energy and that the materialistic civilization is in a way a product of physical health and mental energy imparted by the climatic environment, is now an accepted

truth.¹⁵ The regions showing maximum degree of materialistic culture and mechanised civilization, such as in eastern U.S.A. and the north-western Europe, exert a strong pull on the population of the adjoining lands and have gradually become some of the most congested spaces on the earth's surface.

(b) *Availability of Water Supply.* The density of population in India, as in other countries, is mainly controlled by the availability of water supply. The tracts which enjoy inherent advantage in respect of soil and natural irrigation and acquired advantages in respect of artificial irrigation, cultivation are both highly extensive and intensive, and the population also highly dense. This statement points to the overwhelming importance of soil and agricultural water supply as determining factors in the problem of the density of population. When we speak of agricultural water supply we think not only of natural irrigation which depends upon climatic factors, and ultimately on rainfall, but also of artificial irrigation, the aim of which is to modify the unstable agricultural conditions produced by deficient or uncertain rainfall.

Although rainfall affects the density of population in India to a great extent, but there are exceptions to it. Assam has three times more rainfall than Gujrat and Deccan, yet it has a lower density than either of these. West Bengal, Bihar and East U. P. are far more densely populated than any other parts of India, having a rainfall of 76" and 47" only. Thus a casual observer might be tempted to assert that there is no correlation whatever between the rainfall of a given tract and the population which it supports. But a close relation undoubtedly exists there. There are certain considerations which must be taken into account. *Firstly*, although a certain amount of rainfall is necessary for successful cultivation, there is a point beyond which an additional quantity is no longer beneficial but may be injurious. 40" has been considered as a necessary amount for India provided it is timely and properly distributed and it is only when it is less than this or unevenly distributed that it affects cultivation and indirectly the density of population. The deficiency is made up by the provision of irrigational facilities and it is for this reason that Madras (east-south coast) with 32" of rain has much the same density as the west coast with

¹⁵ According to E. Huntington, three conditions of climate—temperature, humidity and variability are of greatest importance in affecting health and energy. According to him the ideal conditions for human progress are: (a) an average annual temperature that ranges from somewhat below 40°F. for the coldest month to nearly 70°F. in the warmest month; (b) a relative humidity that is moderately high, except in hot weather and rainfall at all seasons; and (c) a constant succession of cyclonic storms bringing frequent moderate changes in temperature—E. Huntington, *Civilization and Climate* (1924), pp. 387-411.

110". In Gaya, the canal irrigation has turned a most infertile tract, a large part of which was sandy and unproductive, into a region of rich fertility.¹⁶ The same has been the case with west U. P. and East Punjab.

Dr. Gangulee also reaches the same conclusion that "there is a striking tendency for the density to decrease with a decrease in rainfall and a tendency for the density to increase with an increase in rainfall. Thus in Eastern Gangetic Plain with 42" of rain the density is high in comparison to the Western Gangetic Plain with only 30" of rainfall".¹⁷

Crops, no doubt, cannot be raised without a certain amount of water but the extent of cultivation and character of crops are also determined by the shape of the land. Where it is level, practically every inch can be brought under the plough; water can be retained in the land by means of small ridges to supply the moisture, there is no erosion, and permanent cultivation is possible but where the land is undulating, the bottoms of the slopes (which get the drainage and detritus from the higher levels) are extremely fertile but on the slopes themselves, cultivation is more precarious, and it becomes increasingly so at the top. The higher the field the more rapidly does the water drain off from it, and the greater is the need for constant and regular rain. On high ground, even a short break is injurious to the crops and a long one destroys them. Whenever land in a slope is broken for cultivation, it becomes subject to erosion and soil is soon washed away. Therefore, on such grounds only the hardier and the less productive crops will grow and long intervals of fallow are required in order to regain the fertility. Throughout India the most thickly peopled tracts are level plain—this is notably the case in West Bengal, Bihar, East U. P. and low-lying plains along the sea-coast in the southern peninsula. In west U. P. and East Punjab the surface of land is equally favourable and rainfall is more scanty and less regular but it is supplemented by irrigation. The region which contains the coastal districts of Orissa and North Madras (with a rainfall of 50") has a relatively low mean density but this is so because it includes on the west a considerably hilly area, while on the east near the sea the ground is swampy and impregnated with salt. In the intermediate strip between the littoral and the hills the density is as great as in many parts of the lower Ganges plain. Want of water is the main explanation of the comparatively sparse population in several more or less level tracts such as Gujrat, West Rajasthan and West M. Bharat. In Assam there are extensive tracts of hills, jungles and sandy

¹⁶ *Gaya District Gazetteer*, p. 135.

¹⁷ B. N. Gangulee, *Trends of Agriculture and Population in the Ganges Valley*, p. 1

stretches in the Brahmaputra, where permanent cultivation is out of question. Here climate also plays its part. The country is extremely malarious and even in the tracts which could support many more persons the population is practically stationary.

Similarly, those parts of the dry lands in the world which have been reclaimed in part by irrigation works also support a moderate population. The coastal deserts of Northern Chile and southern Peru (which locally can obtain water from Andean streams); the Kalahari of southern Africa (which receives slightly more rainfall than the other regions) and the Colorado or Sonoran desert of south-western North America support moderate population, but the mid-latitude deserts of the Great Basin, the Caspian Basin, the Gobi and the Takla-Makan are relatively unused by man since they fail to provide him with water or food.¹⁸

(c) *The Physiographic Relief.* The influence of physiographic relief on the spatial distribution and segregation of human settlements is clearly indicated by the fact that approximately nine-tenths of the world's and three-fourths of India's population live on plains, having an average elevation of 1500 ft., above the sea, though the world area consists of 12% of mountains, 14% of hills, 33% of plateaus and 41% of plains.¹⁹ As against this our country consists of 11% of mountains, 18% of hills, 28% of plateaus and 43% of the plains.²⁰ In a plain habitat, the superior facilities for carrying on higher means of livelihood, such as arable farming and manufacturing industries and the high degree of mobility for transportation and communication purposes have undoubtedly induced man to settle and congregate together. In fact all the important centres of early civilization, teeming with swarming population, were born and nourished in the cradle of Tigris-Euphrates plain, Nile Valley, Indo-Gangetic plain or of Yangtze basin, and the Kwantō plain near Tokyo. Even the present day foci of modern civilization grew up and developed in plain lands, and all the great centres of human agglomerations of our time are located in plains. Hardly there is strictly a montane city with one lakh population. Thus while high Himalayas or the lofty Alps, Rockies or the Andes are shunned by man, Gangetic plain or the Rhineland is swarming with humanity. The extreme ruggedness and dissected nature of the land with no plains available for settlement has invariably resisted any growth and development of large cities in south eastern Rajasthan, Assam or the Deccan plateau. South East Rajasthan and Assam have no large cities.

18 Freeman and Raup, *Essentials of Geography* (1949) p. 408.

19 Freeman & H. F. Raup, *Essentials of Geography* (1949), p. 408.

20 *Census of India, 1951, Vol. I, Pt. I-A, p. 36.*

(d) *Natural Fertility of Land.* Unquestionably the natural fertility of the soil, which gives a heavy return in agricultural enterprises and offers good prospect of harvest, is one of the most potent factors for the congregation of agrarian population on the productive land of the earth. Once again, the coastal plains and the Yangtze basin of China, lower Gangetic plain, Malabar Konkan and North Madras and Orissa Coastal plains of India, and the Nile valley came into prominence, where the mighty rivers issuing from the central Asian Massif or Western Ghats or Central African Highland, and fed by monsoonal rainfall in summer, succeeded in depositing enormous layers of alluvium only to respond to the call of the plough and certainly this was one of the most favourable geographical conditions for the age-long sedimentation of human alluvium in those lands. The high degree of agricultural productivity besides other factors, can justifiably account for the concentration of about 110 millions of human souls within the natural border of the lower and upper Gangetic plain. The lower Gangetic plain has only 6.6% of India's land, yet it maintains 19.4% of the entire population—the density of population being 832 persons per sq. mile. The upper Gangetic plain, covering 4.8% of India's land area has 10.9% of its population the density being 681 persons per sq. mile. Even the Malabar Konkan having about 3% of the land area supports 7% of the country's population; while North Madras and Orissa Coastal plains contain 3.6% of the land area but support 5.8% of the population. In all these regions the soil is very fertile and the rainfall is normally ample and never excessive so that agriculture is carried on to the utmost extent. The same is true of some parts of rural China and the North Western Plains of Europe, where high productivity of land effectively maintains the enormous agricultural population.

In fact, the early centres of population were very often those in which land was not only most fertile but also easily cultivable.²¹ Once such favoured tracts were occupied density began to increase as a result of concentration of activities within a limited area surrounded by natural barriers. "Men built up their institutions and concentrated their efforts, while the surrounding country was neglected or uninhabited altogether."²²

(e) *Nature of Crop Cultivated.* The nature of the crops also affect the distribution of population in a given area. It will be observed that the predominantly rice growing tracts are also the centres of dense population like those of lower West Bengal, Orissa coastal plains, Malabar and Konkan coastal plains etc.,

21 B. N. Gangulee, *Trends of Agriculture and Population in Ganges Valley*, p. 1.

22 La Blache, *Principles of Human Geography*, p. 66.

whereas the west Indo-Gangetic plain, eastern Rajasthan, M.P. etc., where wheat is the principal crop has a relatively low density of population. In the rice-growing tracts the combination of crops is such that the more valuable or heavy yielding crops contribute to a large extent to agricultural productivity and can, therefore, support a comparatively high density of population. Apart from the particular combination of crops which are to be found in the rice growing tracts there are several reasons why the predominance of rice cultivation co-exists with a high density of population, while the predominance of wheat cultivation co-exists with a comparatively low density of population.

Firstly, wheat grows in many climates on almost any soil, with varying rainfall and with but little cultivation after the seed is once grown. It is, therefore, eminently suited to extensive agriculture, particularly in regions of moderate rainfall. It is obvious that while extensive agriculture always implies a low density of population, a high density of population is always characterised by intensive subsistence farming. But as Professor Carver says, "while wheat is an important crop in the world's commerce, it is a poor one from the point of view of intensive farming."²³ Rice, on the other hand, requires far more careful and laborious cultivation.²⁴ In the fertile tracts of the Gangetic plain and its delta and coastal plains, rice cultivation thus requires a large labour force for the preparation of seed-beds, transplantation and other agricultural operations incidental to the intensive farming. Wherever transplantation rice is grown there is to be found a comparatively high density of population than in places where rice is grown broadcast.²⁵

Secondly, the yield of rice per acre is very heavy relatively to the yield of any other food crop. Under good conditions 50 pounds of rice will furnish seed for an acre of transplanted rice, and the yield will be 3500 pounds or fiftyfold. This amount when combined with some beans or meat to furnish protein, is ample food for five adults for a year. Thus a population of 2000 per square mile is possible. On that basis all the people in the United States could be supported on an area equal to New York State.²⁶ In fact it is the abundant return yielded by rice crop which accounts for a high density of population in such lands as the river plains and the deltas of the Ganges, the Yangtse, the Hwangho, the Si, the Mekong and the Indus.

Thirdly, wheat with its one crop cannot support as many people as rice can with its three possible crops a year. Two of

²³ T. N. Carver, *Principles of Rural Economics*, p. 157.

²⁴ E. Huntington & S. W. Cushing, *Principles of Human Geography*, p. 284.

²⁵ *Ibid.*, p. 284.

²⁶ *Ibid.*

three crops raised on the same land in the same season no doubt put a great strain on the productive capacity of the soil but in the monsoon regions the fertility of the soil is maintained by the deposition of rich silt by the annual floods.

It would be interesting to note that in the monsoon regions a fairly well balanced diet has been evolved in two ways. Firstly, people in the rice-growing regions have depended upon plants for proteins. As legumes contain more proteins than any other vegetable food, beans and peas have become favourite articles of consumption, in addition to other cereals and vegetables rich in protein. Secondly, the deficiency of protein is also supplied by fish, which is found in abundance in the numerous rivers, water courses and tanks in the plains and deltas of these regions. Thus in these regions the high yield of rice, supplemented by the proteids contained in the legumes and fishes, is capable of supporting high density of population.²⁷

(f) *Availability of Power Resources.* The mineral wealth and power resources of a region influence through industrialisation the concentration of population within a given area in two definite ways. While there is gradual depopulation of the area where such fuels and minerals are absent, entirely new urban conurbations grow up resulting in gradual concentration on such hitherto uninhabited lands. Thus in England Birmingham and New Castle became great centres of human agglomeration but East Anglia and Pennine foothills gradually became depopulated. In India, Chhota Nagpur division is gradually gaining ground as her diverse natural resources are being fully exploited. Similarly, with the completion of Damodar Valley and Hirakud Projects the regions covered by them are bound to attract large population because of their rich mineral resources—comparable to that of Ruhr-Rhine valley. Jamshedpur, Raniganj, Jharia, Chitranjan and Asansol are fast developing in population because of the industries connected with the availability of coal, iron, and other raw materials. Even in Europe there is to be found a close coincidence of extremely congested areas with well developed industrial regions of Donetz, Ruhr, Saar and Lorraine pre-eminently noted for their raw materials and manufacturing industries. In U.S.A. the density of population shoots up high around the Appalachian coal-fields and the Pennsylvanian industrial region. The growth of population with industrialisation is a common phenomenon. The industrial way of living brings better food supplies, less danger of local famines, larger economic opportunity, an increase of literacy and education and better hygiene and sanitation.²⁸

(g) *Geographical Location.* Geographical location with

27 B. N. Gangulee, *Op. Cit.*, pp. 98-99.

28 P. E. James, *Geography of Man* (1931), p. 14.

respect to important trade routes, traffic lines and communication links to and from the world's market is a predominating criterion for the growth and expansion of almost every important conurbation of the world. London, Paris, Hamburg, Tokyo, New York, Bombay and Calcutta have become notable nuclei of human agglomerations teeming with millions of lives, only due to their favourable and advantageous geographic location with respect to the world's commercial zones and markets. Prof. Mark Jafferson's study has strikingly brought out the fact that the concentration of more than a tenth of the world's population within the narrow confines of less than a hundred great cities, is in large part due to geographical factor of favoured location.²⁹

(h) *Supporting Capacity.* Supporting capacity or the means of subsistence in different regions of the world is also responsible for uneven concentration of population over the face of the earth. Thus, while the 'hunting and fruit gathering stage' of culture in the Tropical jungles of Congo Basin or the Malayan peninsula, the desertic lands of Sahara or Arabia or the Tundra lands of Siberia or the interiors of Deccan—Satpuras and the Aravallis and the Himalayan Tarai—do not even in the most favourable circumstances maintain a density of one person in 50-100 sq. miles of land. Whereas the pastoral stage of culture in the Sudanese land, the Central Asiatic Steppes, the Manchurian plain or the Deccan is able to sustain a population density of 2-5 persons per sq. mile. Under the next higher stage of agricultural adjustment an optimum population burden of 500 per sq. mile of land can be easily supported by typical agricultural region. In the Gangetic plain, the density of population in a number of divisions ranges from 1000 to 2000 persons per sq. mile. While in some riverine tracts of China the pressure of population even reaches to 6000 persons per sq. mile. All these stupendous pressures of population in the Oriental lands is maintained solely by agricultural adjustments, though not without seriously lowering the standard of living. The fishing occupation also presupposes a relatively settled population and therefore, greater density. This pursuit is responsible for high density in southern China, and along the coast of Japan, Br. Columbia, or England as well as along the lagoon coasts of west India and the Gangetic Delta where hundreds of small fishing villages may be seen.

The industrial and commercial stage in the cultural ecology of a region is associated with tremendous increase in the supporting capacity of the demographic pressure, and some of the largest industrial regions of the world like Saar, Ruhr, Lancashire,

²⁹ M. Jafferson, *Distribution of World's City Folks—A study in comparative civilization—Geographical Review*, Vol. 21, pp. 446-465 (July 1931).

Pennsylvania and Hooghly side in Western Bengal, etc., easily support some of the highest pressures of population over the earth—the density being well over 1,000 persons per sq. mile. The commercial activities are further associated with the highest density of population—and as a matter of fact, a number of giant ‘dinossaur’ cities have sprung up in the recent times, each of which has received a heavy precipitation of as much as 8 to 10 million human lives within its narrow confines. London, Ham-burgh and New York contain 8.8 and 10 millions of human lives respectively. Compared to these Bombay, Calcutta and Delhi have only 2.83 and 1.1 million persons only.³⁰ Thus in general, regions in which hunting, herding, logging, forest agriculture, and other primitive occupations are widespread have low densities of population. On the other hand those regions where agriculture is favoured by combination of soil and climatic conditions and where industrial revolution has been experienced can support relatively high densities of population.³¹

2. NON-GEOGRAPHICAL FACTORS INFLUENCING DISTRIBUTION OF POPULATION

In addition to the above environmental conditions a number of non-geographic factors are also responsible for the dispersion and accumulation of population in different parts of the earth. The age long socio-religious outlook accepting large families as the principal units of social solidarity and the aims at maintaining large families with inherent insistence on early marriage and need of progeny, together with a strong social cohesive tendency to keep all the members of the family near to the ancestral lands by discouragement of outward migration, have all undoubtedly led to intense congestion of human lives in the agricultural lands of China, Japan and some parts of India as well. The very ignorance of the techniques of artificial birth control as also the absence of continence habits in life, contribute greatly towards the oversaturation of population in all these Oriental lands.

Further, the political forces operating through the Government policy of systematic encouragement of emigration or restriction towards foreign immigration are none the less significant factors in spatial distribution of human lives over the earth. While the after effects of restriction on foreign immigration to U.S.A. in the year 1921 and 1924 led to a gradual congestion of population in Great Britain and particularly in Japan, a free and encouraged emigration from overpopulated Britain to the new lands of Canada and Australia subsequently resulted in great relief to the former. The progressive growth and expan-

³⁰ *Census of India, Paper No. 1 (1952)*, pp. 24-25.

³¹ O. T. Freeman and H. F. Raup, *Op. Cit.*, p. 407.

sion of settlements in the numerous Pacific islands and in Manchurian plains is due only to the constant encouragement and advocacy of large-scale emigration from overburdened soils of China and Japan.

Lastly, it should be borne in mind that the pattern of population over the entire surface of the earth with her local and regional anomalies, is a function of variety of causes in which the geographical elements play a very prominent role, while the social and political forces are contributing factors of no less significance. It must be conceded that none of these factors is individually responsible for the disparity in population distribution over different parts of the world and also that with the progressive evolution in scientific civilization of our time, some of these factors will lose their significance altogether while new and complex conditions will emerge out, rendering the whole problem of population anomaly over the habitable surface of the earth very unstable and in a 'state of constant flux'.

CHAPTER 15

GROWTH OF POPULATION IN THE WORLD

Various estimates of the population of the earth have been made from time to time. Even now censuses are far from accurate, e.g., in Europe, America, Australia and India, fairly reliable censuses have been taken. In other lands under European control some form of census of varying degrees of accuracy or reliability, has also been taken. But there are vast regions in the interior of Africa, in South America, in China and in the Muhammadan countries stretching from Afghanistan to Arabia where no census has ever been taken correctly. The position in the inter-tropical Americas from Mexico to Brazil is no better. For these regions we have only estimates, based on different methods, and of varying degrees of accuracy and reliability. Some of these estimates are based on partial censuses; some are hardly more than guess work.¹

Various authorities have estimated the world population. According to Muhall it was 54 million at the time of the Roman Empire; according to Malte Breen it was 640 million in 1804; according to Balbi it was 379 million in 1843² and it was 1700 million in 1914 by Stoddard.³ Sir G. H. Enibbs estimated the population of the world to be 1649 millions in 1914.⁴ East placed the world population at 1,750 million in 1916.⁵ According to *Times Atlas*, London, 1922 it was 1616 million in 1921, whereas the International Institute of Agriculture estimated the population of the world to be 1820 million in the same year. Whitekar's Almanac for 1926 estimated the population in the neighbourhood of 1849 million in 1925. Statistical Yearbook of League of Nations, 1932-38 computed the population figures to be 2025 in 1931. Thus it will be seen that there is a wide margin of difference between census figures given by these authorities.

The following table indicates the relative growth in world population by Continents from 1650 to 1951^{5a}:—

POPULATION IN MILLIONS

Continents	1950	1750	1800	1900	1947		1951	Per- centage increase over 1650
Europe (includ- ing U. S. S. R.)	100	140	187	266	401	569	591	491

¹ Dr. J. M. Datta, *World Population*, in *Amrita Bazar Patrika*, Puja Number 1950, p. 181.

² Quoted by H. G. Duncan in *Race and Population Problems*, p. 241.

³ Stoddard, *The Rising Tide of Colour* (1920), pp. 6-7.

⁴ Knibbe, *First Census of Commonwealth of Australia*, App. A, p. 31 (1917).

^{5a} East, *Mankind at the Crossroads*, 192, pp. 111-12.

N. America	..	1	1.3	5.7	26	81	157	168	16,700
Central and South America		12	11.1	18.9	33	63	153	173	1,341
Oceania	..	2	2	2	2	6	12	13	550
Africa	..	100	95	90	95	120	191	208	108
Asia	..	320	479	602	749	937	1,238	1,346	308
India	..	100 (1600)	..	120	162.5	235	221	356	256
<hr/>									
World Total	..	545	728	906	1,171	1,608	2,330	2,499	358

It will be seen from the above table that round about 1750 mankind consisted only of 728 millions. Out of this number, 15 million lived in what was then a New World, 713 million lived in the Old World—479 million in Asia, 140 million in Europe and 95 million in Africa.

About 1800, the world population had increased to 906 million. This was a modest rate of growth—only 4.4 per cent per decade or 0.44 percent per annum. The New World grew faster—the rate was 12.4 percent mainly because its growth was being fed by migration from Europe. Asia and Europe grew by 4.5 and 5.7 percent respectively. It is worth noting that even then, Europe was sending migrants to the New World and yet growing slightly faster than Asia. Africa was not increasing; there was in fact a slight decline in numbers.

Fifty years later, in 1850, the population of the world was 1171 million—the rate of growth was 5.1 percent per decade or 0.51 per annum. The New World was growing more than three times as fast—15.5 percent per decade—the tempo of European growth was getting faster—it was now 7.0 percent against Asia's 4.4 percent. Africa too was beginning to add to its population, though at a very slow rate—1.8 percent.

After another fifty years, in 1900, the population of the world was 16.8 million. The rate of growth shows a definite sign of acceleration; the world average rate was now 6.3 percent per decade or 0.63 per annum. It is, however, the New World and Europe taking the lead—the former was growing at the rate of 16.8 percent per decade and the latter at 8.1 percent. Asia stayed behind with 4.5 percent; but Africa had now caught up to that rate.

The population of Europe and the New World had grown from being about one-fifth of the world population in 1750 to about one-third in 1900. The population of Asia and Africa had also grown in absolute numbers; but since their rates of growth

were so much slower than in Europe and the New World, their relative proportion diminished from about fourth-fifths to two-thirds.

During 1900-50, the practice of contraception had grown and become part of the normal mode of conjugal life among the majority of the people in Western Europe and people of their stock inhabiting the New World. As a result, their birth rates have been falling fast. Their death rates had already begun to fall much earlier during the last century. This was the result partly of the fact that the masses of the people had begun to eat more and better food than they had ever known before, and partly of the fact that water supply and sanitation, hygiene, and medicine had begun to make progress. So long as the birth rates remained stationary while the death rates fell, the growth rate was well ahead of the rest of the world. Hence, the difference in the figures of Asia and Europe already observed. But when the European people started contraception the birth rates fell faster than the death rates—with the result that the European rate of growth has been falling. During this period the mean decennial growth rate of Europe had been 6.0 percent per decade; while that of Asia was higher, *viz.*, 6.8 percent—Africa forged ahead with 9.3 while the rate in the New World had dropped from 16.8 to 15.1.

Thus it may be said that the huge increase in world population has not been at a steady rate but at an accelerating rate. From 1650 to 1750 it increased by 33.5 percent, from 1750 to 1850 there was an increase of 60.8 percent, but in the last century a 55.4 percent increase has taken place not in a whole century but in half a century, or about 1.1 percent per annum. Speaking of the population increase in the world between 1900 and 1947 Dr. Swaroop remarks, "The rate of increase in America has been most rapid (112%) and slowest in Europe (36%). In Asia, even though some of the smaller countries such as Indonesia, Philippines and Thailand, etc., recorded rates of increase well over 100 percent, the two large countries, *viz.* China and India, increased relatively slowly at the rates of approximately 39 percent and 49 percent; yet their contribution to the total world increase is almost one-third."⁶

Speaking qualitatively during last 300 years it has grown by over 350 percent, *i.e.*, it is increasing by about 41 each minute, 2,500 per hour, 60,000 people per day or about 25 million a year of which India and China contribute about 4 to 5 million each. Unless the trend is checked it will rise to 45 to 50 million by

⁶ Figures upto 1900 are from Carr Saunder's *World Population*, while those for 1947 are added from U.N.O.'s *World Population Trends (1920-47)* and for 1951 from *World Facts and Figures (U.N.O. 1953)*, pp. 2-3.

2,000. During this 300 year period, the population of Europe grew by 491%; of North America 16700%; of Central and South American 1341%; of Oceania 550%; of Africa 108%; of Asia 308% and of India by 256% during 350 years. "Viewed in the long perspective, therefore, the growth of the earth's population has been like a long, thin, tapering powder fuse that burns slowly and haltingly and then catches on until it finally reaches the charge and explodes."

The world population reached a maximum of 2,652 million by the middle of 1954. Of these number 1,451 (or about 55%) were in Asia (excluding U.S.S.R.), 404 million in Europe; 357 million in the Americas; 214 million in U.S.S.R.; 210 million in Africa and 14.4 million in Oceania. During the period 1950-54 the population of Asia increased by 21 millions per year; Latin America by 4 millions, North America, Africa, Europe and the U.S.S.R. by 3 millions each; and Oceania by 325,000.

In mid-1955, the population of the entire world was estimated at about 2,691 millions, against 2,246 million in 1940; 2013 millions in 1930; and 1810 millions in 1920. Among the individual Nations, China ranks first. Its people numbered 600 millions. India comes second with 382 millions followed by U.S.S.R. (220 millions); U.S.A. (168 million), Japan (90 million), Pakistan (83.6 million), Indonesia (18.9 million), and Britain, West Germany and Italy, each of which now has about 50 million inhabitants.

According to Dr. Darwin at the present rate of increase, the population of the world would be doubled in 52 years. U.N.O. Publication says that at the current rate of increase of more than 1 per cent per annums, the total world population will touch the 4000 billion mark not in some distant future but in the life time of some of our children.⁷

According to the P. E. P. Report on "World Population and Resources", the following table gives the regional distribution of the 34 million people who are now being added to the population of the world each year:—

China	6.5 million	U.S.A.	3.0 million
U.S.S.R.	3.0 „	Non-Communist	
Eastern Europe	1.0 „	Europe Oceania	2.5 „
India	5.0 „	and Canada	
Africa	3.0 „	Latin America	4.0 „

⁷ Dr. S. Swaroop, *Population Growth in the World*, quoted in *Census Report*, 1951. Vol. XI.

Africa	3.0	„	Latin America	4.0	„
World Total			34.0 millions		

The U.N.O'S Population Division following roughly the course of the present and probable future population cycles in various countries has produced the following tentative projects for 1950-80:—

Projected Population in 1980

(Millions)

	1950	1980		
		High	Medium	Low
World	2,454	3,900	3,628	3,295
Africa	198	327	289	255
North and Latin Am.	330	577	535	487
Asia (Excl. U.S.S.R.)	1,320	2,257	2,011	1,816
Europe (Incl. U.S.S.R.)	593	840	776	721
Oceania	13	19.2	17.5	16.1

The rapid increase in population in the world has attracted much attention since the time of Malthus and in recent times there are two groups of persons who hold different views regarding the future prospects of world's population and its resources. The conservationists like Dr Charles Darwin, Dr. Simon, Mr. Burch and Pendell, William Vogt and Osborn, hold that the earth's resources are being expended at a fantastic rate and that at no distant date, if this continues, our whole way of life will have to go seriously downhill in consequence. Dr. Charles observes: "The Golden Age in which we are living cannot last longer.....and hence conservation of natural resources as well as the check in the growth in population is urgently needed."⁸ M/s Burch and Pendell quote the enormous figures of production which would be needed if all the world's people were raised to what is commonly described as a minimum standard—an increase of 50% in cereals; 90% in milk and other dairy products; 15% in vegetable oils; and 300% in fruits and vegetables.⁹ While William Vogt states, "World population represents more of a threat to peace than the atom bomb."¹⁰ Osborn holds, "Unless the human fertility is controlled and

⁸ C. Darwin, *Next Million Years*, 1952.

⁹ Quoted by G. I. Burch and E. Pendell, in *Population Roads to Peace or War*, 1945, p. 30.

¹⁰ *News of Population and Birth Control*, No. 1, p. 1.

Nature's principles accepted human beings will have to fit themselves into the great slaughter house of Nature because the limit has reached where nature has seized to be a good mother".¹¹ To others "next to the atom bomb, the most ominous force in the world today in uncontrolled fertility."¹² "Those extra mouths may be a danger for the future comparable to the danger of the hydrogen bomb."¹³

The technologists like Bernal, John Russel, Dr. Brown and Prof. De Castro and Kirtley are optimistic about the future. They hold that man has made brilliant new inventions whenever they are needed and therefore there is no limit to these processes of inventions and hence no need to fear from the growing population. Bernal writes, "That if the available good agricultural land of the world were worked by best methods, it would provide a food supply between 2 to 20 times the amount required to give the present world population an 'optimal food consumption'."¹⁴ John Russel is also optimist in this regard.¹⁵ While Dr. Brown believes that it is possible to produce on this earth 25 times the present food supply from all conceivable sources including a billion acres of large farms.¹⁶ De Castro observes that "there are about 16 million acres of land to cultivate....as yet the area cultivated has not reached 2 billion acres. There are some 2 million known species of animals, but only 50 have been domesticated and contribute to our food supply. Similarly, out of the world's 350,000 vegetable species, only 600 are cultivated by men. Hence, science holds the promise for man to conquer other planets and use sea for cultivation."

It would not be inappropriate to examine the growth of population in some important countries. The following gives the growth of population in some countries since 1800 to 1950.

Year	Brazil	England	France	U. S. A.	Japan	India
1800 ..	3,620	8,840	27,130	5,300	N. A.	N. A.
1850 ..	7,234	17,773	35,630	23,260	N. A.	120,000
1860 ..	8,418	23,128	36,510	31,503	N. A.	N. A.

¹¹ F. Osborn, *Our Plundered Planet*.

¹² H. Fairchild, *The People*.

¹³ *News of Population and Birth Control*, No. 27, p. 2.

¹⁴ Bernal, *The Social Function of Science*, pp. 346-479.

¹⁵ J. Russel, *The World Population and World Food Supplies*, 1955.

¹⁶ H. Brown, *Challenge of Man's Future*, 1954.

1870	..	9,797	28,072	38,440	38,655	35,000	N.A.
1880	..	11,748	29,710	57,450	50,262	36,550	N.A.
1890	..	14,199	N.A.	38,380	63,056	N.A.	235,900
1900	..	17,984	26,990	38,900	76,129	44,285	235,500
1910	..	22,216	N.A.	39,540	92,267	50,743	249,000
1920	..	27,404	42,769	39,000	106,543	55,963	248,100
1930	..	33,568	44,705	41,610	123,091	64,450	275,500
1940	..	41,144	46,605	41,000	131,970	72,410	312,800
1950	..	51,976	48,841	41,944	151,677	88,900	356,000

From the above table it would be clear that the population of India rose from 120 million in 1850 to 356.8 million in 1950 i.e., India witnessed an increase of 197.3 per cent within a period of 100 years. In this hundred year period, the population rose from 7.2 million to 52 million in Brazil—an increase of 622 per cent; from 35.6 to 41.9 million in France or an increase of only 18%; from 18.4 to 46.3 million in Italy or an increase of 151.6%; from 15.3 to 27.9 million in Spain or 82.3% increase; from 7.5 to 25.7 million in Mexico or 242.6% increase; from 1.1 to 17.2 million in Argentina or 1463.6% increase; from 23.2 million to 151.6% million in U.S.A. or 553.4% increase and from 17.7 to 43.8 millions in England and Wales or an increase of 147.4 per cent.

Thus it may be inferred that our rate of growth per decade during this period has been of the order of only 19.7 per cent as against 62.2 per cent in Brazil; 24.2 per cent in Mexico; 143.6 per cent in Argentine; 55.3 in U.S.A.; While countries like France had a decennial increase of only 1.8 per cent; Italy 15.1 per cent; Spain 8.2 per cent; and Japan 18.2 per cent. In comparison to these figures our increase does not seem to be very high. But what matters is that during this hundred year period we had added a very large figure to our population in absolute numbers—on an average 23 million per decade as against 4.4 million in Brazil; 3.1 million in England and Wales; .6 million in France; 12.8 million in U.S.A., 1.6 million in Argentina.

This net addition to our population need not constitute a problem if an overwhelming majority of population not to speak of every individual, enjoyed the irreducible minimum requirements of decent human existence in terms of food, clothing, shelter, education, health, employment and leisure for recreation. But this is not so in India—where majority of people are living below sub-human level—and, what is worse, is the well known and depressing qualitative aspect of our popula-

tion problem. As the quality is related to the quantity it cannot be improved in the context of our available resources without controlling the quantity.

Rate of Natural Increase. In order to appreciate the large growth of population and its future trend it is necessary to examine the determinants of a growing population, which are fertility, mortality and migration. The age and sex composition of its people, the size of the family, the peculiar social characteristics affecting births, deaths and migration, the economic conditions of the people and the degree of population consciousness of citizens all affect the future growth of population.

The question of increase in population by immigration or decrease of population by emigration does not arise in India. India has attracted very few persons of foreign domicile so far—only 77,865 excluding U.K. and Commonwealth citizens on December 1952¹⁷, probably because of heavy density of population and poverty, ill-health conditions of the people and also because of the peculiarity of the social and religious organisation. This tendency will certainly continue in future too. So also emigration is a remote possibility, by which method population of India can be decreased, because of political reasons. Today the total number of Indians abroad who were born in India or abroad is below 4 millions or about one percent of the total population of India. The number is small partly because of the immobility of the Indian labour to foreign countries and mainly because of the policy of discrimination and hostile attitude of the receiving countries towards the Indian settlers—although no such restrictions exist for the people of European decent. Further recent citizenship difficulties experienced by Indians in foreign countries like South Africa, Ceylon, Malaya, Kenya, East Africa, Australia, New Zealand and Canada is also responsible for smaller number of emigrants to the foreign countries.

In the absence of migration as a contributory factor to the growth of population, the birth and death rate must have played a vital part in determining the population growth in India and the present tendency in them will show the future trend. Whatever figures are available show the following trends:—

17 G. Mortara, *The Development and Structure of Brazil's Population in Population Studies*, Vol. VIII, No. 2 (1954), p. 121. Figures for Japan are taken from *National Censuses*, and for India from K. Davis books and *Census of India, 1951*, Vol. I, Pt. I-A.

Birth and Death Rates and Rate of Natural Increase

		Birth rate per 1,000		Death rate per 1,000		Rate of Natural Increase	
		Recorded	Estimated	Recorded	Estimated	Recorded	Estimated
1881-91	.. ..		48.9	..	41.3	..	7.6
1891-1901	..	34	45.8	31	44.8	3	1.4
1901-11	..	37	48.1	34	42.6	3	5.5
1911-21	..	37	40.2	34	48.6	3	0.6
1921-31	..	33	46.4	26	36.3	7	10.1
1931-41	..	34	45.2	23	31.2	11	14.0
1941-51	..	28	30.9	20	27.4	8	12.5

The increasing difference between the birth and death rate i.e., the net survival rate has been responsible for the rapid growth of population in India. This survival rate has been fluctuating between 1.4 and 14 per thousand. During the decade 1881-91, it was 8 per thousand because this period was free from any exceptional calamity. But during the next decade it fell to 2 because of the famine conditions which not only affected the birth rate but also adversely affected the death rates. Plague also took heavy tolls of human lives. During the next decade as the seasonal conditions were more favourable, the birth rates rose and the death rates fell and hence the rate of natural increase was only 5.5. But during 1911-21 the successive bad agricultural seasons and crop failures, epidemics and diseases again affected the natural rate of growth. Since 1921-31, it has been increasing because during these periods the birth rate has been falling a little while the death rate has fallen more rapidly (as in 1931-41). The picture is one of prevailing high fertility, somewhat lower mortality and a growing rate of natural increase which is adding huge increase to our population. This shows that the attempts so far made to decrease the death rate through the provision of better medical services, control of famines and epidemic diseases, have been successful but there have been no attempts made or unsuccessful attempts made to control the birth rate. The factors that will induce lower fertility are the deliberate postponement of the age of marriage, improvement of the social status of women and the decrease in the size of the family. Unfortunately each of these factors continues to be unchanging in India and as a result the birth rate continues to be same and the disparity between the birth and death rate becomes more and more potent.

It may, therefore, be safely assumed that the present tendency of a fall in death rate will continue to operate. This

is only natural as the Bhore Committee observes, "The rate of decrease in fertility tends to lag behind that of mortality. This was the reason why in the 19th century when a better standard of living and improved health services brought about a marked fall in the death rate, there was a remarkable increase in population.¹⁸ Similar opinion is expressed by Dr. S. R. Sen. He observes: "With the extension of public health measures and attempts at improving the economic condition of the people, which no modern Government can overlook except at its own peril, death rate is bound to go down and it is obvious that if this control of death rate is not matched by some sort of check—natural or artificial—over birth rate as well, the net reproduction rate is sure to go up and the pressure of population is bound to be even more serious than what it is today.¹⁹

The rate of natural increase in India varies from 10 in Central India to 16-17 in North West India, as would be clear from the following Table.²⁰

Mean Decennial Rates per 1,000 (1941-50)

Zones			Birth	Death	Natural Increase
North India	..	..	38—39	27—28	11
East India	..	..	38—39	26—27—28	11—12
South India	..	..	36—37	21—22	15
West India	..	..	42	26	16
Central India	..	..	44	34	10
N. W. India	..	..	41—42	24—25—26	16—17
India	..	..	40	27	13

In India the rate of natural increase is as high as 13 whereas in countries in U. K., it is 4.5, in France 5.8, in Belgium 4.11, in Denmark 8.9, in Austria 2.6, in Japan 12.6, in West Germany 4.5, in Norway 10.5, in Switzerland 6.8. But Indian rate is lower than that of U. S. A. where it is 15.1; New Zealand 15.3; Netherlands 14.1; Canada 19.3, Ceylon 28.5; and Brazil 24.²¹

On the basis of this natural increase of 13 per thousand the Census Commissioner of India for 1951, has predicted that India's population will reach to 410 million in 1961, to 460 millions in

18 *Report of the Health Survey and Development Committee*, Vol. III, p. 48.

19 S. R. Sen, *The Problem of Population and Agricultural Production in India*, in *Agricultural Situation*, November Issue (1954), p. 521.

20 *Census of India, 1951*, Vol. I, Pt. I-A, pp. 183-84.

21 *Demographic Year Book*, 1954.

1971, and 520 million in 1981.²² According to Dr. Swaroop it will reach the figure of 700 million in the year 2,300. While Dr. Raja and Shri Lal predict that this figure would be reached by the year 2,200 and according to Prof. Davis in the year 2,500.²³ In this connection Lord Simon observes that, "Without allowing anything for the accelerated death control, even if birth and death rates pursued a course in India similar to what occurred not only in Britain but in all Western industrial countries, the population would, at the end of 200 year period would be about 1½ billion." It is obvious that widespread starvation would begin long before such a point was approached. It is surprising that India's growing population is considered to be the coming danger spot of the world. Dr. W. S. Thompson observes in this connection, "It should be remembered that it is not poverty alone, that leads a people to talk about pressure of population, but the growing awareness of relative poverty, and the knowledge that through the exercise of power other peoples have been able to secure a better living. An India of 800 million will be more aware of her relative poverty than she is today, and probably better able to muster force to obtain what her people consider a fair share of the world's resources."²⁴ Criticising Dr. Mukerjee's suggestion for accepting a policy of mass migration to the empty lands of world, Vogt observes, "a heavily industrialised India, backed by such population pressure, would be a danger spot to the entire world."²⁵

Natural Increase in World Population. Statistical tables published by the W.H.O. of population trends in thirty countries from the beginning of the country show that birth rate, after the post-war increase, is beginning to level off, that death rate continues to fall, and that natural increase of population remains at a high level.

A selection from the countries studied below shows the following natural increase per thousand.²⁷

Rate of Natural Increase in Some Countries

Countries	1901-5	1936-38	1953
Denmark	14.2	7.3	8.8
England & Wales	12.1	2.9	4.5

²² *Census of India, 1951, Vol. I, Pt. I-A, p. 190.*

²³ K. Davis, *Op. Cit.*, p. 247 and Swaroop and R. B. Lal, *Population in Indian Journal of Medical Research.*

²⁴ Lord Simon, *Some Aspects of World Population and World Food Resources in Eugenics Review*, Vol. 46, No. 2 (1954), p. 98.

²⁵ W. S. Thompson, *Scientific America*, February 1950, p. 14.

²⁶ W. Vogt, *Road to Survival*, p. 228.

²⁷ Quoted in *Manchester Guardian*, 20th Jan., 1958.

France	1.7	0.5	5.8
Italy	10.7	9.0	7.4
Portugal	12.0	11.3	12.1
Switzerland	10.3	3.8	6.8
Ceylon	12.1	14.4	28.5
Canada	..	10.3	19.2
Japan	11.4	11.8	12.8
U. S. A.	..	6.0	15.1
Australia	14.6	7.8	13.8
India	..	11.3	13.0

Dr. Notestein observes that "the population of Soviet Union has increased from 147 million in 1926 to 170 million in 1945, further growth is expected and it will probably exceed 203 billion mark by 1950 and 251 billion by 1970, if the present rates of fertility and mortality continues"²⁸

About Brazil Mortara remarks "If the rate of natural increase observed between 1940 and 1950 should continue during the 50 years this country would have 168 million in 2,000 against 51 million in 1950".²⁹

Of Belgium's future population trends Dr. Glass has calculated that on the basis of fertility and mortality rates of 1935, the population would reach 7.41 million in 1980 and fall to 6.68 million in 1995 and 6.45 million in 2,000.³⁰

Egypt's population was estimated at about 2½ to 3 million at the end of the 18th century, and 4¼ million in the middle of the 19th century and by 1897 it was 10 million and by 1955 it was 22 million. On the basis of these movements the Sub-Committee of Egypt's National Population Commission, remarks, "In the light of the recent evolution in the birth and death rates, it is possible to project population of 28 million in 1965. But if the birth rate were to remain at its present level and the death rate to go down for some time, the increase in the population would be still greater."³¹

In 1920, the population of Venezuela was about 2.4 million in 1950 it was just under 5 million. The projections made by the U. N. O. indicate that by 1980, it may reach a total of somewhere between 10 and 13 million.³²

28 F. W. Notestein, *The Future Population of Europe and Soviet Union*, 1944, p. 42.

29 G. Mortara, *Op. Cit.*, pp. 122-23.

30 D. V. Glass, *Population Policies and Movements in Europe* (1940), p. 156.

31 *Eugenics Review*, Vol. 47, No. 4 (1956), p. 208.

32 U.N.O., *Population of South America, 1950-80*, (1955).

According to the estimation of the Welfare Ministry, Japan's population will reach 100 million in 1970 and after passing through the summit of 108 million in around 1990, it will take a descending curve for the first time in more than a century. With decrease in birth rate, it is estimated that natural increase of population will decrease gradually year by year showing annual rate of 7-8 lakhs for next 10 years and 6-7 lakhs for the following 10 years from 1965. But the serious problem lies in the fact, that the total population will continue to rise for at least the next 30 years."³³

The Royal Commission on Population estimates the future population of Britain on three assumptions: (a) assuming the same size of family as among the couples married 1927-38, the increase would come to an end between 1977 and 1982 and it be followed by a decline at first extremely slow but coming slightly faster in the next century, it would be 50.2 million in 1962; 50.7 million in 1977; 48.9 in 2007 and 45.5 million in 2047. (b) Assuming the family size 6 per cent higher than in (a) the growth will continue steadily upto 1987 when it would be 52.3 million and thereafter the figure will stabilize at about 52.6 million. (c) Assuming the family size falling the decline in the population will start before 1977. It would be 48.6 million in 1977, 41.5 million in 2007 and 29.6 in 2047. These figures suggest that if there is no further fall in average family size, there will not be any appreciable reduction in total numbers for many years to come.³⁴

Of Ceylon Dr. Simon observes, "With the application of DDT, malaria has been completely abolished in Ceylon, so that death rate has fallen in last few years right down to the Western level, but birth rates have not begun to fall. The result is that the population is increasing at the rate of 2.7 per cent per annum, this means that if it continues, the population would double in thirty years."³⁵

William Vogt estimates that at the current rates of population increase there are at least 40 nations, colonies, and territories that will double their population by 1984, unless Malthusian checks interfere. According to him a few countries of Latin America needed to double are: Costa Rica, 20 yrs; Mexico 24 yrs.; Puerto Rico 24 years; Dominican Republic 25 yrs.; U. S. A. 34 yrs; Egypt 31 yrs; Cuba 33 yrs; and Hawaii, 31 yrs.³⁶

³³ *Mainichi Daily*, quoted in *Free Press Journal*, 16th Nov., 1955.

³⁴ *Report of Royal Commission on Population*, pp. 84-85.

³⁵ Lord Simon, *Some Aspects of World Population and Food Resources*, in *Eugenics Review*, Vol. 45, No. 2 (1954), p. 98.

³⁶ W. Vogt, *How Safe Are We?* in the *Report of the Third International Conference on Planned Parenthood*, 1952, p. 38.

From Clarks' formula we get the following results with regard to India:

Present rate of growth of Population : 1.25% per annum.
1.254 — 5% of the national income.

Present Rate of savings — 5% of the national income.
Economic Investment Nil.

Hence, no rapid industrialisation, no rise in real income per head and hence no rise in the standard of living. This is the situation we get it in India today.

POPULATION CYCLE

The various stages of demographic history can be linked up to form a pattern which may be called a 'Demographic' or 'Population' cycle. Various writers have studied this pattern in various ways. We shall, however, take up Dr. Simon's classification here. Dr. Simon divides the demographic cycle into five stages as follows :

1. *High Fluctuating Stage*. Which represents the normal state of man-kind before the scientific and industrial revolutions of the last 200 years. This stage is marked by high fertility and mortality rates (about 35 per thousand) so that regular increase in population is very slow. The economy of the countries in this phase is basically agrarian and the agricultural population hovers near the Malthusian subsistence level. England passed through this stage prior to the Industrial revolution.

Afghanistan, Tibet, Manchuria, China, Arabia, Persia, and parts of South America come under this stage. The increase in population in these countries is conditioned by the frequent occurrences of famines, pestilence, floods and droughts.

2. *Early Expanding Stage*. When the death rate began to decline rapidly while the birth rate remained constant. England and Wales passed through this stage from about 1750 to 1880 — in the latter period the birth rate was about 33 and the death rate about 20.

In countries belonging to this phase agricultural methods are improved by various scientific devices so that food supply becomes more abundant, natural resources begin to be developed, machine industries founded, public health and transport facilities improved so that movement of food supplies is facilitated to famine areas. Banditry is suppressed and general security increased to the establishment of a strong Central Government. These all factors encourage the rapid growth in numbers. India, Indonesia, Malaya, Burma, Philippines, Thailand, Indo-China,

Formosa, Korea, Turkey, Egypt, Israel, Central America and Latin America belong to this stage.³⁷

3. *The Late Expanding Stage.* With declining fertility (after 1880 the birth rate began to fall rapidly (50 years later it had fallen by more than one half to about 16 per thousand) and with mortality declining more rapidly (to about 12 per thousand). U. S. S. R., Japan, Argentina, Poland, Hungaria, Roumania, Yugoslavia, Italy, Spain and Chile belong to this phase. The economy of these countries is based relatively on advanced agriculture and modern industry. Industrialisation has brought with it urban pattern of living accompanied by modern sanitation.

4. *Low Fluctuating State.* With low fertility (births of about 16%) balanced equally by low mortality (deaths about 12%). There was in England and Wales as well as in all other Western countries a baby boom after the war which did not last long; more countries seem now to have settled down to a rather steady and small increase except in U. S. A. where births are still surprisingly high. The countries coming under this phase are Britain, France, Belgium, Czechoslovakia, Denmark, Norway, Sweden, Switzerland, Australia, New Zealand. The economy of these countries is characterised by highly developed industries, mechanised agriculture and the excess of urban population.

5. *Declining State.* When the fall in birth rate is such that before long the population begins to decline rapidly.

Thus the demographic cycle cuts across various countries at different stages of their population evolution so that different stages of the demographic cycle. Lord Simon is of the opinion that population cycle throughout the West has been generally similar to that in England and Wales; though of course, there are all sorts of variations in details.

6. In the earlier stages the decline in mortality started by changes in agriculture and communications which improved food supplies both in quality and quantity—which rendered periods of dearth increasingly rare. Later on, death rates were reduced further by public health policies and the development of medical science, which resulted in particularly striking falls

37 F. W. Notestein, *Population the Long View*, in T. W. Schultz (Ed.) *Food for World*, 1945, pp. 36-57; (ii) W. S. Tompson, *Population and Peace in the Pacific* (1946), pp. 26-35; (iii) P. K. Welpton, *World Population Trends Proceedings of the International Congress on Population and World Resources* (1948), pp. 48-56; (iv) C. P. Blacker, *Stages in Population Growth*, in *Eugenics Review*, (1948), pp. 88-102; (v) Lord Simon, *Some Aspects of World Population and Food Resources in Eugenics Review*, Vol. 46, No. 2 (1954).

of mortality in childhood and young adult life. The reasons for the decline in birth rate are complex and not fully understood. A major factor was no doubt that in primitive days children were an economic asset to the family; as countries become wealthier and the period of education extended, children became increasingly heavy burden on the family budget. At the same time the emancipation of women caused an increasing revolt against excessive domestic drudgery; and whereas in early days it was necessary to have six children if two were to survive, this became gradually more and more unnecessary.

From the point of view of population increase the vital factor is the lag in the fall of births against death. In England and Wales births only began to fall 130 years after the decline in the death rate had begun. The period varies, but in all Western countries the delay has been substantial; least of all in France, where the early decline in birth rate greatly reduced the increase in population, and indeed threatened a declining population a generation ago.

The problem of population in the West is for the time being neither urgent nor very important, at least as regards food, but the position in the underdeveloped countries like the countries of South East Asia, which include three-fifths of human race is very different. These countries have not gone through two revolutions like that of the west—one the revolution of agriculture, industry and public services, and second, the medical revolution which leads to health. About half a billion of the world's population have been through these two revolutions, but one and a half trillion people in the underdeveloped countries have hardly begun to enter them.

Population Cycle in India. It may be mentioned that India has just begun her population cycle. The last thirty days in India correspond roughly with the thirty years of declining death rates which began in Britain 200 years ago and required 180 years for their completion. But India suffers from grave disadvantages as against Britain's position at that time:

First, she is very poor, her standard of living is substantially below what was Britain's in 1750.

Secondly our population is large—fifty times what Britain had at that time, and she has relatively little additional land to be brought under cultivation.

Thirdly, although vast amounts of empty lands occur in the world, but they are not open for Indian immigration because of race hatred, colour bar and migration policies of those countries.

Fourthly, the industrial development of India has a far more difficult problem than Britain had; she has to compete against very efficient leading Western Industrial countries who have had an advantage of an early start in the industrial race.

Fifthly, India's problem is made still more difficult by the fact that if death rate is controlled by the application of medical and sanitary knowledge, the rate of population increase would be remarkable. If death control should be made as effective in India as it has been in Ceylon, the annual increase would be not five but ten million unless some sort of other check is resorted to.

CHAPTER 16

MOVEMENT OF POPULATION

The peoples in the world, in fact, have never been stationary; from times immemorial population movements have been going on, as a result of which every country has received and sent various intruding groups to and from other countries. India too has received groups of invaders from the N.-W. F. P. from time to time to settle upon its vast productive plains. Even Great Britain too has received a number of peoples from the Roman days even to the end of present century consisting of Romans, Russians and Germans. Egypt and Iraq have also to tell the same tale. The pressure of population, lack of food supply and the spirit of aggression demanding additional resources from the neighbouring regions for its population have been the principal causes of this movement. According to Dr. A. C. Haddon, this movement has been due to either (i) expulsion, which takes place either to death of food or (ii) attraction of one sort or the other. This generally happens when hardy tribes living either on the hilly places or the dried steppes, swoop down on the peace-loving, and prosperous agriculturists of the plains and insist on sharing with them their riches, either settling among them or carrying off all they can get by plundering.

Under migrations of expulsion are included the mobility arising out of the wants, needs, and ambitions—the economic, intellectual and political—resulting in the creation of vast empires, the development of new lands, by colonization, increased world-wide intercourse both commercial and intellectual and the attainment of higher level of civilization.

The movement of the primitive peoples is very simple but mountains deserts and seas and dense forests are a great check to their easy migration. This thing is further assisted by ignorance and restricted outlook on their part. It was the desire of expansion that led to the opening up of the overland trade routes in the Middle Ages between Europe and the Far East through the Persian and Central Asian deserts. With the development of the trade movement became more frequent and widespread, affecting the culture and civilization of other countries. Civilised tribes, as a rule are less mobile owing to their love of home but at the same time are highly aided by their genius and knowledge to even have a control over nature by clearing forests, embanking rivers, building roads in all of which they are assisted by the modern means of transport.

Where the conquerors are in very small numbers than the conquered people, who because of their majority cannot be either expelled or dislodged, then under the circumstances the

conquerors settle themselves amidst them affecting the life and culture of the conquered to a great extent, e.g., Normans in England, Moghuls in India, but where the intruding people are more superior in culture, then the language, religion, customs, methods of the conquerors permeate into the life of the conquered. It was for this reason that ancient India was Aryanized, modern India Anglicised; Eastern and Southern countries bordering the Mediterranean was Arabianized, while the Central and South America Latinized.

Migrations bring about a great deal of intermingling of races and civilisation. This has been well evidenced by the historical invasions often repeated in various parts. This led to the expansion of geographical horizon. This settlement of the outsiders results in the inevitable ethnic inter mixture, e.g., the raids of Moghuls in India greatly affected the people by leading to an intermingling of races and blending of civilisation.

Under peaceful conditions, agriculture develops, population increases, means of communication improves, with the result that the geographical outlook expands to a great extent. This gives rise to movements for settlement and colonisation. Small groups first migrate but in course of time the number reaches very high. This type of migration is very common among all countries at the present time. The largest streams of population movement are in Asia. From North China there go annually over 1,000,000 people into the frontier lands of northern Manchuria. Another stream of Chinese emigration chiefly from South China moves southward towards the less populated regions of Thailand, French Indo-China, Malaya, and the islands of Dutch East India except Java. Similarly Indians migrate in large numbers to Ceylon, Mauritius, East and S. E. Africa, S. America, etc. National expansion takes place chiefly because of colonization. It is due to this colonisation that Great Britain has been holding a supreme position in the world, Holland too postulated with new life and energy and Russia also became a powerful country of the world. When no suitable lands are left for colonisation, great conflicts arise between different nations giving rise to wars.

Trade and Commerce also helps Migration. When a new land is discovered it is soon occupied by the traders followed by the settlers and the soldiers, and others follow the trade. It was for the development in trade that led the French to colonise in the cold Canada; and the Russians across the Northern Asia. Similarly the Chinese trade; East and West led to the movements of the former to the latter. It was the very idea of trade in valuables and spices and silk that led to the discovery of sea-route to India and the Far East. Another kind of expul-

sion due to religious, political or social differences has also led to the extensive migrations. Large groups move to pilgrimages to lands distant and near. Pilgrims, passing through other lands, stimulate trade and contribute to commercial, intellectual, and cultural developments among the people of various regions in the way. Thus the Hindu pilgrimages have influenced the peoples of various parts of the country by having commercial and cultural intercourse with them as they do when they go to Badrinath and Kedarnath in the north, Jagannath in the east, Dwarka in the west or the other famous temples of Southern India. Similarly certain places attract large numbers because of their scenic beauty. Similarly Islamic places of pilgrimage attract a large number of followers of Islam from both the east and west to assemble at Mecca. Not only the pilgrims but traders also come. Some merchants drop out and settle at some suitable lands on the way while others return.

Tourist Traffic also affects Migration. Tourist parties go in large numbers. Such movements apart from having the commercial aspect have a propagandist effect, and by enlarging the geographical outlook become the bases of future policies of states. Large numbers of pleasure-seekers go every year to Switzerland, Kashmir or the U.S.A. These tourist travellers are greatly encouraged by the concession rates granted by the steamship companies.

Migrations of attraction have taken place in modern times for different reasons. The spirit of adventure combined with a need for more scope, led to the colonization of western states of North America by dwellers in the east. A desire for speedy acquisition of wealth prompted the Spanish treasure raids in the 16th century while in modern times various gold rushes to Alaska and Australia have been notable. Through such migrations the most arid and unpromising lands have become centres of heavy population, and several parts of the world are inhabited that would otherwise have long remained unpeopled and solitary. Thus the recent migrations of Europeans or Americans have been for political and commercial exploitation. These nations have sought new places as the market for their manufactures, as is well illustrated by the British in India; the Spaniards in Brazil; the Dutch in East Indies; the French in Indo China; the Japanese in Manchuria and China; and the Americans in the Philippines.

The migrations also take place due to desire for better land and milder climate and easier conditions of life. Being led by this motive Mongolians have frequently invaded the fertile plains of China and Turan; pastoral persons have invaded the peaceful agriculturists of the Iraq and India valley as far as Ganges Valley also. Similarly milder climates have also attracted peoples in large numbers, e.g., the scenic skies of the

Mediterranean have attracted the people of the bleak Baltic coasts; and the equable wet western Europe attracts the people of the extreme and dry east.

Thus it will be clear that various forces are at work in attracting or retarding the movement of population, all of which forces differ in purpose, direction, character and the numbers concerned. But all these forces end in differentiation and assimilation. When population movements result in the occupation of the land of a relatively low people, the two types of population co-exist for some time, showing marked differences in race, conditions of life and localities. Thus castes in India often marked out by different shades of colour may be regarded as survivals of ancient ethnic differentiation.

With the increase in the population of the world and improvement in the means of communication, geographical segregation becomes more significant. The process of assimilation means slow absorption and welding the differentiated peoples into one. But sometimes it has led to the extermination of the peoples as in the case of Red Indian or the Australian and Indian aboriginal races to the secluded places. But where the climatic conditions have not been suitable for the settlers the process of assimilation is restricted to the spread of their language. Religion, economic methods and culture race differentiations persist.

The study of the migrations reveals the important fact that the migrating peoples have adhered to their own zone and even in some cases to their own parallel of latitude. Migration beyond the range limits of the native zone is generally restricted in the range as well as in the number of peoples concerned. Migrants usually do not settle in zones of unhealthy climates, unless it is unavoidable, or unless they are helped by the superior civilization in surmounting the difficulties of this type. The example is afforded by China, though it lies outside the tropical zone, yet its people have very ably adapted themselves in the tropical countries comprising Java, Borneo, Malaya, Sumatra and the Philippines.

The principle of adherence to Zone, parallel of latitude is strictly illustrated by modern colonial movements and race expansions. The important examples are: The English and Irish in New England states on the Atlantic Sea-board; Scots in Canada, the Germans in the interior of the lake region; the Spaniards in the West Indies and the Mexican plateau; the Italians in California and the Southern parts of U. S. A.; the Scandinavians in the lake region; the Icelanders in north Canada; Russians in Siberia and Japanese in Manchuria, North China and Jehol. Similarly the migration of South Indians to Malaya or Ceylon, and of Indians to East and South Africa. Mauritius, Trinidad and Br. Guiana also illustrates the same fact.

CHAPTER 17

POPULATION PROBLEM OF INDIA

India's total population is second highest in the world preceded by China, whose population is 583 million, according to the Demographic Year Book, 1955. Our population was 384 millions in 1956. It is interesting to observe that though India occupies 2.2 percent of the world's total area of land, she supports 15 percent of the world population against China's 20 percent. Ours is 1.8 times the population of U.S.S.R. 2.4 times that of U.S.A.; and 7 times that of U.K. Humanity consists of not less than six and not more than 7 persons for every person living in India. India records 1,620 births and 1,100 deaths every hour and so with each striking hour of the clock, new mouths require to be fed; and during the same period death snatches away 32 mothers and 304 infants. The tremendous mental shock to over 26,000 families within 24 hours can better be realised than described.

The following are the special features of our population problem:—

1. Our population is growing at a relatively rapid rate. In 1901, the population of India was about 235 millions; in 1951 it was about 357 millions; and in 1956 it was about 390 millions. Thus in half a century, the population has increased by 121.3 million or by about 51 percent. During 1891-21, the growth of population had been irregular and fitful due to severe famines, bubonic plague, cholera, malaria and influenza epidemic, so that the net increase was only 12.2 million. But during the next thirty years, 1921-51, the growth was more heavy and regular, yielding a net increase of 27.4 million. This rapid increase was due to the prevalence of peaceful conditions, subsequent improvements in the methods of census operations, the absence of prolonged periods of education and training to the youths; the rapid developments in the means of transportation leading to easy distribution of foodstuffs in times of emergency in different parts of the country and improvement in medical and health facilities. It may be pointed out that the real problem in India is not the rate of growth but the net increase to the total population. We had added in the last two decades about 81 million people, i.e., a little more than one and a half times the population of U.K. in 1951, or more than $5\frac{1}{2}$ times the population of Canada, or more than $1\frac{1}{2}$ times that of Brazil. This massiveness in the growth in the context of our present economic set up is a matter of alarm rather than jubilation, because it is this large net addition that constitutes the problem as it negatives all

efforts to improve the sub-human low standard of living of our masses.

The following table summarises the growth of India's population since 1901¹:—

Growth of India's Population, 1901-51

Census Year	Population in millions	Decennial growth in millions	Percentage Increase or Decrease
1901	235.9	..	0.2
1911	249.0	13.5	5.6
1921	248.1	—0.9	—0.4
1931	275.5	27.4	10.4
1941	312.8	37.3	12.7
1951	356.9	44.1	13.2

Our rate of natural increase² is 13 per 1,000 persons, while it is only 4.5 in U.K., 5.8 in France, 401 in Belgium, 8.9 in Denmark, 12.6 in Japan, 4.5 in Germany, West; and 6.8 in Switzerland. Our rate is however, lower than U.S.A., where it is 15.1; New Zealand, 15.3; Netherlands, 14.1 and Ceylon, 28.5.² On the basis of this natural increase, Sir Gopalaswamy had predicted that India's population will reach to 410 millions in 1961, to 460 in 1971, and 520 million in 1981.³ According to Dr. Swaroop it will reach to 700 million in the year 2300; while Dr. Raja and Shri Lal are of the opinion that this figure would be reached by the year 2,200 only. I am of the opinion that with the extension of public health measures and attempts at improving the economic conditions of the people, death rate is bound to go down and it is obvious that if this control of death rate is not matched by some sort of check—natural or artificial—over birth rate as well, the net reproduction rate (which is 1.454 at present) is sure to go up and the pressure of population is bound to be even more serious than what it is today. Therefore, what is needed is to put a check on this indiscriminate growth of population.

2. The distribution of population is quite uneven in the country. Though the average density of population is 312 persons per square mile, yet there are areas which are swarming with humanity while others are shunned by men. It may be pointed out that the density of population is as high as 832 in the lower Gangetic plain; 681 in the Upper Gangetic plain; 638 in the Malabar Konkan, 554 in south Madras; while it is as

¹ *Census of India, Report for 1951, Vol. I, Pt. I-A, 1953, pp. 112 and 126.*

² *Demographic Year Book, 1954.*

³ *Census of India Report, 1951, Ibid., p. 190.*

low as 332 in the trans-Gangetic plain, 247 in South Deccan, 246 in North Deccan, and 226 in Gujerat-Saurashtra. The density is still lower in North-East Plateau, North Central hills, North-West hills, the Eastern Himalayas, the Western Himalayas, and the desert area, it being 192, 164, 163, 118, 68 and 61 persons per square mile.

Like regional variations in density, there are also variations in the density of the States. It varies from 3,017 in Delhi to 901 in Kerala; 775 in West Bengal; 598 in Madras; 572 in Bihar; 253 in Bombay; 152 in Madhya Pradesh and 121 in Rajasthan and only 10 in Andaman and Nicobar Islands.

The fact that some parts of the country have much greater density than other parts has prevented a proper utilisation of the country's resources as there is over-crowding and congestion in some parts, while in other parts there are too few persons and the available resources are not fully utilised. Some idea of this pressure of population on land in India can be had from the fact that, on an average, the net sown area is only 0.82 acres per head of population.

As between the urban and rural areas, the latter have a much larger proportion of Indian population. Out of 357 millions of people in the country only 62 millions or 17.3 percent live in cities and towns which number 3,018 while the remaining 295 millions or 82.7 percent live in the villages which number 558,089. With the industrialisation of the country there has been a constant shift of population from the rural to the urban areas and while in 1921, 88.7 percent of the population lived in rural and 11.2 percent in the urban areas, in 1941 only 86.1 percent lived in the rural areas and 13.9 percent in the urban areas and in 1951, about 83 percent lived in rural and 17 percent in urban areas. In Western countries the percentage of persons living would be clear from the table given below⁴:—

Distribution of Rural-Urban Population

Country	Rural	Urban
U. S. A.	33	67
Germany	33	67
England	19	81
Sweden	68	32
France	58	42
Austria	55	45
Canada	38	62

⁴ *Demographic Year Book, 1954.*

Italy	29	71
U. S. S. R.	77	33
Japan	63	37

Although less than one-fifth of the total population live in cities and towns in India, yet it has created grave problems for our cities are associated with overcrowding, slums, bad housing and living conditions, lack of recreation and sanitary conveniences, and adverse sex ratio especially among the working class people. This has resulted in the spread of promiscuity, venereal diseases and alcoholism. In the words of Dr. Mukerjee, "In thousands of slums of the industrial centres in India manhood is unquestionably brutalised, womanhood dishonoured and childhood poisoned at its very source."⁵

Hence, planned efforts must be made not only to redistribute the population from the densely populated regions to those which are thinly populated but also to improve the present conditions of the city life. This can be done by planned and scientific development of available land according to the various needs of the community.

3. Population in India is growing faster than its means of subsistence. Recent figures corroborate this fact.

*Index-Numbers of Area under Food Crops and
Growth of Population (1947-48=100)*

Year	Area under Food Crops	Total Food Production	Population
1948-49	108.5	99.04	110.9
1949-50	113.5	105.2	110.9
1950-51	112.2	95.4	121.9
1951-52	112.1	98.0	123.6
1952-53	118.0	113.3	127.7
1953-54	122.2	128.3	129.4
1954-55	121.4	126.3	130.9

It may be noted that whereas the area under food crops increased by 21.4 percent, and the total food production by 26.5 percent over the 1947-48 figures, the population increased by 30.9 percent, which is a clear proof that it has outstripped food supply. The food supply available to the average Indian is not only insufficient in quantity but also deficient in quantity lacking calcium, necessary vitamins and proteins. People are, therefore, subject to chronic under-nutrition. Our consumption of

⁵ R. K. Mukerjee, *Indian Working Class*, 1951, p.

food and cloth per head per day is 1,700 calories and 16 yards respectively. Millions exist in rural hovels and urban tenements deprived of even the basic necessities of civilized existence. Thousands live and sleep on our pavements and lead a parody of life, and millions are denied of the barest minimum medical facilities. The percentage of literacy is also very low—only 16 percent being literates. Males are more literate—24.9%—than the females—7.9%. What is more annoying is that in spite of literacy campaigns, the number of illiterates is increasing more rapidly than those of the literates.

4. India is not over-populated in the absolute sense, because all known methods of production are not employed to the fullest extent to exploit the natural resources and hence population has not been provided with wealth, so that India is at the bottom of the economic ladder from the point of view of the per capita income. Our per capita net output is only Rs. 262.1, which is very low in comparison with some of the important countries of the West.^{5a}

But India is "relatively" overpopulated because on account of unavoidable circumstances like illiteracy, internal dissensions, long neglect of industries, antiquated methods of production, there is neither enough wealth nor means of livelihood for the existing population. In relation to the existing stage of her industrial and agricultural resources, India is definitely overpopulated. Pressure of population, which of course, varies in intensity in different parts of the country, is shown and felt in various ways: by general trend of food imports; small size of agricultural holdings; increase in the number of landless labourers; all related to the fact that the total area under cultivation has not increased so rapidly as the population so that the per capita cultivated area, double cropped area and the irrigated area has diminished (from 111 cents in 1921 to 84 cents in 1951; from 13 cents to 10 cents and from 18 cents to 14 cents)⁶—by high percentage of arable land under food crops (77 percent as compared to 23 percent under non-food crops;⁷ extremely low output per person engaged in agriculture and other occupations (the output per person engaged in agriculture was Rs. 500 in 1950-51, while the corresponding figure for mining and manufacturing industries was Rs. 1,700; railways and communications Rs. 1,600; banking, insurance and other commerce and transport Rs. 1,500; small enterprises Rs. 800; professional and

5a The national per capita income of Japan is Rs. 978; Newzealand, Rs. 5,296; Australia, Rs. 4,694; U.K., Rs. 9,410; Canada, Rs. 6,516; France, Rs. 3,931; Sweden, Rs. 4,912; Denmark, Rs. 3,654; and Switzerland, Rs. 4,895. (Vide *Commerce Annual*, 1956).

6 *Census of India Report*, 1951, Vol. I, Pt. I-A, pp. 141 and 146.

7 C. B. Mammoria, *Agricultural Problems of India*, 1957, p. 212.

liberal arts, Rs. 700 and the domestic service, Rs. 400); low density of livestock per sq. mile as well as per 100 persons which has resulted in the deficiency of animal protein in food and undernutrition of the masses; and lastly by the mounting pressure of unemployment, and underemployment.

5. We are a much marrying people, we marry early and we marry in large numbers. Being a hot country girls in India attain puberty very early between the ages of 12 and 15. According to Age of Consent Committee, about 50 percent of the girls get married before they complete the 15th year. Although Child Marriages are punishable offences, yet it was revealed by the 1951 Census that there were 2,833 married males, 6,118,000 married females, 66,000 widowers and 134,000 widows—all between the ages of 5-14 i.e., about 9,200,000 young Indians under the age of 15 were found married in contravention of the law.⁹ Out of every 1000 persons, 458 males and 482 females were married, or in other words, it might be said that 50.9 percent of all males and 60.2 percent of all females were either married or widowed. If males and females are reckoned together the unmarried people formed 44.1 percent of the population.

It is of interest to note that with the advancement in age, the ratio of spinsters among the women declines rapidly and the number of those married rises sharply, e.g., during 1941-51, in the age group 5-14, of the total females 85.1 percent were unmarried, but this percentage decreased to 17.2 in the age group 15-24 and to 2.9 in the age-group 25-34. By the age 75 is reached only 3 percent of the males and 1 percent of the females remain unmarried. Only 20.3 percent of the males aged 15 and over and 6.4 percent of the females aged 15 and over were found unmarried during 1951. The comparable percentages for the U.K. was 26.9 and 25.5; for U.S.A., 33.2 and 33.2 and 55.8; for West Germany, 28.9 and 29; and for France, 30.5 and 25.0 respectively.¹⁰

These figures show that in India marriages are universal, for if we take into account widows and widowers as well as ascetics and mendicants, almost every one of the marriageable age is married. This is because marriages are regarded as sacramental and no power neither any economic consideration like poverty can interfere with marriages. The result is that the couple begins to get the child comparatively earlier than in other countries. Early marriages, ill-advised pregnancies and deli-

⁸ *India*, 1957, p. 191.

⁹ *Census of India Report*, 1951, Vol. I, Pt. I-A, p. 72.

¹⁰ *Ibid.*, p. 74.

veries and maternal and infant mortality form a vicious circle in which Indians are entrapped.

6. Early and universal marriage has resulted in 80 per-cent of the girls in India in the most fertile period (15-20) to be found in the wed-lock. During 1941-51, the percentage of child-bearing woman (15-35) to the total population was 44 per-cent. It is this number which is of great importance because births occur to married females of this age group. In India the reproductive period of females generally extends from 15 to 45. Hence, taking the average of thirty years of child-bearing period, and Indian woman who completes this period gives birth to between 6 and 7 children, as against 2.6 in U.K., 3.3 in U.S.A., 5.2 in Japan, 6 in Brazil and 7 in U.S.S.R.

Regarding the fertility of Indian females following facts may be noted:

(1) Most of the women bear most of their children before they are 30. In the tropical lands, maturity and ovulation begin much earlier and become increasingly irregular in the middle age.

(2) Every woman bears more children in the first half of the child-bearing period and fewer in second half. As a matter of demographic fact, the fertility performance is concentrated in India in the earlier part of the reproductive period and then flags.

(3) The age-group 15-20 is most fertile, the next age group is also fertile but less than the previous one and after that the reproductive power decreases rapidly until it exhausts itself at 45. The Census Commissioner for 1941 found that if the wife belongs to the age-group 15-20, the average number of children born per family is 7; it is 5.4 in the age-group 20-25 and 4.9 in the age-group 25-30 and so on. This shows that the higher the age of wife, the lower is the fertility rate, and hence the less the number of children per family. The following table gives the same conclusion:¹¹

Child Birth Indices (Based on a 10% sample data collected at the 1951 Census)—No. of children born per month					
States	Age of the mother at the birth of the first child		All-ages Completed Maternity (mother aged 45 and over)		
	15-19	20-24	15-19	20-24	15-19 20-24
Travancore-Cochin		Do.	4.6	4.0	7.3 6.4

¹¹ *Census of India, Paper on Maternity Data*, p. 83.

East M. P.	Do.	4.5	4.0	6.8	5.9
North-west M. P.	Do.	4.5	3.9	6.9	6.0
South-west M. P.	Do.	4.4	4.1	7.1	6.2

(4) Indian women are more fertile than their sisters in the Western countries. Here the family grows "earlier and faster" as different order of births occur earlier than in western countries. The total number of birth which occurs in course of a year among about 1,000 people of India is 40. Among these 40 births, 8 births are the first births; 16 births are second births; 23 are third births and 17 births are fourth births or births of higher order.¹² While in England, the total number of children born every year, among 1,000 people, is only 15. Out of this number, 6 are first-born; 5 are second-born; and 2 are third-born while only 2 children are fourth-born or of a higher birth order. In India, most births occur to mothers who have already given births to three or more children. This "improvident maternity Incidence" rather "improvident parenthood" in India is 42.8; whereas it is only 19.2 in U.S.A., 14.3 in U.K., 19.3 in France, 12.3 in Western Germany.¹³ It is interesting to note the average expectation of life as birth varies inversely with improvident parenthood, as would be gathered from the following table:—

<i>Improvident Parenthood and Expectation of Life</i>		
Country	Improvident Parenthood	Average Expectation of Life.
U.S.A.	19	61
U.K.	14	66
Japan	34	56
India	43	32

This improvident maternity requires to be stopped to a negligible figure.

(5) Indian birth rate is usually high, though of late it has been falling but not so rapidly as the death rate. During the decade 1941-50 the average birth rate was 40 per thousand per year; while the recorded rate for the decade was only 27.2. Our birth rate is still higher-being 30.5 in 1955 per 1,000 persons in comparison to other countries, like U.K. where it is 15.4; U.S.A., 24.6; New Zealand, 24; Germany 15.7; France, 18.4; Belgium 15.5 and Japan 19.4.¹³

High Indian birth rate is due to early marriages which

¹² *Census of India, 1951, Vol. I, Pt. I-A, p. 87.*

¹³ *Ibid.*, p. 88.

subject the girls to the risk of motherhood at a tender age, when they are of weak constitution and physically immature. They begin to reproduce as mechanically as they accept the grind of domestic drudgery. Absence of family planning; promotion of widow remarriages among a section of the population, low education; and low social capillarity are other contributory factors. Poverty of a hopeless, static type tends to breed an attitude of indifference and irresponsibility.

(6) Fertility rates are lower in the urban areas than in the rural areas. This is chiefly due to the adverse sex-ratio in the cities, hard conditions of family life, employment of married women, the relatively high percentage in cities of middle class families with strong economic motives towards family limitation; the availability of contraceptives and information in the use of birth control devices through clinics and maternity hospitals and child welfare centres and above all housing difficulties and the increasing demands that are made on human energy by the more intense and more competitive social activity of modern life so that the energy available for reproductive activity is diminished thereby.

(7) The fertility in the high income group is lower than in the low income group people. This is because the first group is better supplied with educational qualifications, better jobs, better incomes, and consequently a better and higher standard of living, which in itself is conducive to low fertility. Besides as there is a social ban on widow remarriage among this group, many women are withdrawn from potential motherhood. But contrary to this group, the other group is steeped in poverty with low standard of living. As poverty is favourable to generation, therefore, procreation in the lower income group people is increasing more rapidly. In fact, we in India have a multitude of unprofitable children not because we desire them but because we do not mind their numbers.

(8) The relative scarcity of women is another striking characteristic of our population. In 1951 there were 947 females for every 1,000 males. In 1941, the sex ratio was 934; in 1931 and 1921 the ratio was 940. Contrary to India, there is an excess of females in all countries of Europe (except Ireland and Bulgaria). U.S.A., had 1010 females per 1,000 males (1949), Japan 1038 (1948), England and Wales 1063 (1948); Germany 1465 (1946) and France 1114 (1946).¹⁴

The shortage of females in India is due to incomplete enumeration of females; the excess of males at birth (the ratio being 108 to 100); neglect of female life in the early childhood

14 U. N. *Monthly Bulletin of Statistics*, June 1956.

and early marriages leading to impaired health due to frequent child-births.

7. A study of the distribution of population according to age-groups reveals that about 41 percent of the population is working population, and the youngest age-group is slightly less than double the eldest group (3.74 and 21.9 percent respectively). It has to be remembered that a considerable proportion of the females belonging to high castes among the Hindus as well as those under the *purdah* are precluded by customs and the institutions of the country from contributing to the production of wealth except in so far as they perform the services as mothers and housewives. At the most favourable estimate it would be proper to say that the burden of supporting the entire population falls upon 30 percent of the population, as we have a large percentage of juvenile population and unproductive section in comparison to other countries.

A heavy proportion of dependents acts as serious drag on our production and improvement of living standards. In India, for every 100 earners there are 250 dependents as compared to 154 in the U.S.A. and 121 in the U.K. Out of a rural population of 30 crores, 6 crores comprise non-working dependents. So with more mouths to feed there are proportionately less hands to work in the country.

8. India is a death-ridden country and we are fundamentally a death stricken people. It has characteristically poor levels of health, low vitality and consequently low span of life. Superfluous millions go down to fatten the tired earth which could not fatten them and this is due to a more confined atmosphere, crowded insanitary dwellings and unhealthy living conditions, insufficient diets and lack of outdoor recreation facilities, complete absence of medical facilities in the industrial and rural areas, and the prevalence of such social customs like *purdah* and early marriage among the majority of the people. The result is that there is a tremendous waste of human resources in India in the form of illness, injuries, impairments, premature deaths, pre-natal losses, permanent maternal disability and maternal and infant deaths. Not only our general death rate but also infantile and maternal mortality rates are high—27, 127 and 20 per one thousand persons. In fact in India the devastating destruction of babies is only matched by the devastating input of babies. Death rate is heavier among male infants upto the age of 10 and after which it lowers down, while those of females is greater in 15-45 period due to frequent child bearing and purposeful neglect of the females. Our span of life is also very short—being only 32 years, which means that too many men who have gathered experience of life and wisdom are snatched away

in the prime of life when they start making a contribution to the welfare of the community. Deprived of such lives, India is bound to be poor. Hence, the conservation of our vast human resources is a matter of primary and fundamental importance.

9. India is a veritable microbes' paradise and one of the greatest cesspools of infection of both the endemic and epidemic diseases. Respiratory diseases, bowel complaints, parasitic infections, malaria, hookworm, tuberculosis, cholera, small-pox, kala-azar, dysentery; venereal diseases and a host of others take a very heavy toll every year. Thus Indians die early, and they die in large numbers. Still more depressing fact is that those who survive suffer much from ill-health. The cost of treating these people and maintaining them in low health, and the indirect cost of man-hours lost in farms, factories and offices must be tremendous.

10. Besides these, there are a large number of persons who are defectives, infirms, socially inadequate and diseased persons. There are about 18 lakhs blinds, 6 lakhs deafs, and about 5 lakhs beggars and vagrants and innumerable insanes, lepers, prostitutes and other bodily deformed persons. These not only cost heavily to the nation's slender resources, through unproductive consumption, but also produce children who are subnormals. Such persons should be checked from procreation by strictly following a programme of compulsory segregation or sterilisation.

To summarise, therefore, we can say that the population problem of India can be epitomised simply one of too many births and too many deaths, resulting in a low survival rate and the surviving population live a life (because they cannot escape it!), but not a good life worth living. They eat much inferior food that is given to animals in other countries, wear clothes that defeat the very purpose for which they are worn and dwell in houses which make horses proud of their stalls. An average Indian is very badly nourished, inadequately clothed, unhygienically housed, poorly doctored and scarcely educated and this is all because we are suffering from torrents of "unwanted babies".

The solution of the above problems, therefore, lies in the following directions:—

1. The first and foremost item on the programme should be the introduction of compulsory education, which will divert children from the fields and the threshing floors to the schools. This will greatly aid family limitation in the rural areas. This will in urban areas, increase the earning capacity of the males, emancipate women and make them economically independent and raise not only the standard of living of the masses but will also lead to postponement of marriages, and consequently reduce

fertility. Besides, education fosters the desire for decent standard of living and creates that rational and questioning attitude which a man must have in order to break away from the age-long tradition of uncontrolled fertility if it comes into clash with his cherished goals.

2. Marriage age should be raised—say 20 for the girls and 30 for the boys—by more strict and effective legislation. This will have a good effect on the reduction of fertility, as the marriages thus delayed will enable the girls to take advantage of the opportunities of education and cultural pursuits which would bring about family limitation. The later a woman marries the less is her chance of having a large family. In a country where marriages are usually arranged, this will of necessity, cause a further delay in finding a suitable husband for a girl immediately after the conclusion of 18 years. So of necessity and not by chance, the actual age at which the girl will get married and have children will be much higher than the minimum age of 18 years set up by legislation at present. This should be more commensurate with our country's social structure and climate.

3. There should be a scheme of Social Security without which people cannot develop the proper psychological attitude towards their future. In the absence of security in old age, sickness, unemployment or accident, they would bank on a large family to afford them better security. "Children are poor man's wealth and a means of insurance too". Land redistribution, co-operative farming and caste equality should also be considered as a part of this programme.

4. Attempts should be made to increase the production both from agriculture and industry and accelerate the speed of urbanization in the country. This will lead to the production of food and consumers' goods in appreciably large quantities—which will in turn raise the national income of the country and ultimately will result in a higher standard of living—which itself will work as a check on high fertility.

5. Death control or the improvement of health of the nation with the help of Western know-how and science should form a vital part of our national health policy. The death control programme—involving the provision of better pre- and post-natal care, mid-wifery facilities, opening up of the Maternity Homes, Child Welfare Centres, curative measures through specialised hospitals and free medical aid to all—should be entrusted to the Central and the State Governments.

6. If death control is increasingly successful, the population will increase more and more rapidly unless birth is correspondingly controlled. Death control without birth control would lead to starvation and epidemics. Hence, side by side

with the death control programme should also be launched the programme of family planning, i.e., planned regulation by a married couple of the pregnancies which are liable to result from their conjugal union, through the adoption of precautions calculated to avoid unplanned pregnancies.

Family planning is necessary in order to enable every married couple to discharge their duty which they owe to their children, i.e., of giving them proper education, protection against premature deaths, feeding them properly and promoting their health and welfare and give them the best start in life which it may be in their power to provide. It is also necessary to enable every husband to discharge his duty towards his wife, i.e., of safeguarding and strengthening the life of his wife by spacing pregnancies. The birth control programme should be left to the voluntary action of the parents—while the Governments should be entrusted with the task of finding out: (i) the most reliable, effective and fool-proof means of contraceptives; (ii) giving essential information and technical guidance to those who have never practised birth control ever before; (iii) distributing appliances or chemical contraceptive free of charge or at the reduced rates to the poor, middle and rural class people; (iv) encouraging voluntary associations, social workers, etc., to assist these services. A fruitful line of research work on anti-fertility medicine to be administered orally, and possibly safeguarding contraception for a month by a single administration.

The creation of authoritative educational material is a vital necessity—posters and models, pamphlets, films, film strips, even plays and pictures, poems, songs, and other visual and aural media in the regional languages and in English for universal use, conforming to a uniform scientific all-India standard with suitable touches of local colour should be provided. Necessary machinery should be created for the spreading of such knowledge in a simple, scientific and yet effective way to reach the illiterate and the under privileged. The necessary contraceptives and contraceptive advice should be given in Government Maternity hospitals, Maternity and Child Welfare centres and Special Clinics. Where such centres are established in smaller towns and village areas, where drugstores and chemists do not exist, advice on contraceptives would be completely wasted when the people seeking such advice could not procure the appliances. It is therefore, necessary that every clinic should have a stock of contraceptive appliances and these should be sold to those who can afford to pay and given away free of cost to those who cannot.

The Study group I of the Second All-India Conference on Family Planning has suggested that clinics in India should function under three categories:

(i) a central family planning unit under the guidance of a panel of specialists and expert doctors, where all aspects of family planning would be undertaken. The purposes of this unit would be: (a) Birth Control (limitation and spacing); (b) Sterility and sub-fertility (diagnosis and treatment); (c) Marriage guidance and counselling; (d) Clinical research in contraceptives; (e) Propaganda machinery and assistance to other clinics; (f) Maintenance of stocks of contraceptives for the use of clinics and for the supply of such stocks to subsidiary clinics at wholesale rates of cost; (g) Statistical evaluation of work; and (h) Training of personnel in the fundamentals of family planning and in the techniques of conception control.

All these activities need not necessarily take place under the same roof but they should be closely co-ordinated. This unit should be an independent clinic or may be linked with a well-established government hospital.

(ii) Clinics attached to maternity hospitals, which would provide birth control services—spacing and limitation—and wherever possible, other aspects of family planning.

(iii) Clinics attached to Maternity and Child Welfare Centres. At these clinics birth control measures would be offered. Through house-to-house visits, propaganda and family welfare education work would also be undertaken. Both fathers and mothers would benefit by health educative talks at these clinics—parental as well as family planning.

There is a crying need for trained personnel to man these clinics and maternity welfare and child welfare centres. Wherever possible, therefore, a unit consisting of a fully trained doctor, health visitor and social worker for a population of not more than 5,000 should be considered—this would entail a vast network of doctors, health visitors, nurses, ancillary personnel, and social workers; the already existing personnel attached to maternity hospitals and to maternity and child welfare centres should be fully trained and equipped to provide family planning services in addition to and integrated with the services that do not prevail at these hospitals and centres. Women doctors engaged in private practice may also be trained in family planning and would be of immense help as part-time voluntary or paid personnel conducting and staffing family planning clinics. Midwives and local social workers can play an important role in family planning in rural areas; all such personnel should be carefully and fully trained to advise families in the use of simple chemical and mechanical contraceptives.

It should be recognised that family planning is a subject that encompasses a specialised field of work and requires scienti-

fic men and women to advise in and control the new schemes that are evolving all over the country. Hence, several branches of science would have to co-operate to build it on sound lines. Medical men and women, nurses and health visitors, demographers, economists, chemists, nutrition experts, sexologists, psychologists, psychiarists, pathologists, research workers, clinicians, statisticians and social workers would all have to co-operate to build a satisfactory programme to cover all aspects of the vast field that must be tackled. To achieve this gigantic task the responsibility lies in two directions. Firstly, on the married couples, who must have the wisdom to plan and space the number of children according to their desire and economic condition. Secondly, on the public health and social welfare organisations and the co-operation of specialised personnels, whose duty should be to assist and guide the people who do not have the knowledge or the wisdom to plan and control the size of their family. By doing this they would be helping to eliminate large and undesirable families and bring health and happiness to smaller and planned families. It is important that the family planning advice should be integrated with family health and welfare programmes.

7. Lastly an over-all improvement of nutrition standards is likely to encourage less prolificness. Recently, the famous nutrition expert, Jose de Castro of Brazil, has stressed that if we compare the birth-rate with the rate of consumption of animal proteins throughout the world, we find a frank correlation between the two factors, the family going down as the consumption of such proteins rises. Thus the improvement of nutrition standards, through a larger intake of protein, will lead to the diminution of fertility.

To conclude, universal education, delayed marriage, provision of social security measures, rapid urbanization, death control together with a corresponding control of births and caste equality and improvement of nutritional standards should all be considered as basic programme for reducing improvident parenthood and developing new wants, ambitions and patterns of living. A population policy that seeks to provide mere subsistence defeats itself. Education and change in social culture and mores of the society, of course, are the sovereign factors from bringing about a new outlook in the family. Demographic policy must not rest on what Prof. Robbins has called a "fodder minimum", for the people but on the amenities, decencies and comforts of civilized life made increasingly available for a larger and larger section of the population by rational family planning. Family planning should form an essential part in all our programmes. Our unwillingness to do it will necessarily result in perpetual poverty or in absolute catastrophes.

CHAPTER 18

LIFE IN TYPICAL REGIONS

1. KHIRGHIZ OF CENTRAL ASIA

Among the many contrasts in Asia, the most striking one that we often come across is that the contrasted groups of PEOPLE inhabit four corners of the continent. In the central steppe grasslands there live the savage steppe men—Khirghis are amongst them—as nomads, while on the other side live the Hindus and Buddhists leading a calm and peaceful life. Life on these Steppe grasslands is often a bleak affair; and even the hardy tribes or races find it difficult to live there. But swarms of men inhabiting the plains meteoric in nature as ephemeral as the Steppe grass offer lessons of great interest for the study of geographers.

The people of the Steppe plains are essentially nomad wanderers by necessity and are similar to the herds of antelopes and wild asses that are the natural inhabitants of the continental interiors. Their population is small and yet the completeness with which the Khirghis life and character are determined by natural surroundings makes the relation between physiography and life far more evident and striking than more highly civilized people. They became a race hardened by the severity of the climate and the land; herdsmen, for the land is unsuitable for agriculture; horsemen, because of the harsh struggle for existence and the temptation to plunder more settled peoples.

The foremost feature of the Steppe lands are the dry plains and plateaux, which stretch almost from the Yellow Sea to the Danube, are cut into by barren mountain masses, and great waterless desert tracts. These facts determine the character of animal life and mode of living of man. The climate being cold, vegetation scarce and snow lasting; animals cannot permanently inhabit the plains unless they migrate to warmer regions. During the summer the conditions are ideal for herbivorous animals. Man turns these facts to his advantage by adapting himself to permanent nomadism. The Khirghiz are therefore always on move from pasture to pasture. The Khirghiz shepherd changes his residence for at least two times a year. His family and herds of stock must be with him. Many other factors, as the stock of grazing grass, shifting snow-line, and the ground near the encampment becoming foul during rains force the nomads to change their place of habitation. It is thus the force of physical environment which leaves nomadism as the only condition for human occupation to Steppe dwellers.

The little groups of 'Yurta' or 'Kibitka's' (tents) which the

traveller encounters on this great expanse of Steppe land are not really as forlorn as they appear. Each of these is the home of a nomad family, and the whole group is itself a small family belonging to the larger clan or tribe which is usually headed by a nobleman.

The necessity to move, irrespective of status, compels people to live in portable Kibitakas built of *Kamish* (reeds) covered with felt. Usually the huts have no window, but the interior of the tent is not dark for the daylight streams through a hole in the roof which works both as a window and chimney; the smoke from the fire of dung, which is almost the only fuel available, goes through the sky and the daylight lights up the interior of the tent which is furnished with gaily decorated boxes, rugs and picturesque hangings.

These places are all ordained by ritual, but it is more than probable that this ritual is ordained by the necessity of always having everything ready for a quick move—a move that can be prepared in some thirty minutes. The need for maximum portability encourages the nomad to lavish such wealth as he has, in the first place, on increasing his herds, which supply him with every necessity of housing, clothing and food, and secondly on the purchase of fine rugs and festival clothes.

The everyday wear of the people, however, is a long cotton gown, quilted in winter for warmth, and usually weatherworn to tawny, russet brown or yellow, very torn, dirty and greasy. Poor nomads are reputed to wear their clothes until the garments drop to pieces. Men and women wear the same sort of over-gown and, both sexes being expert horse riders, all wear comfortable sliding boots. The sleeves of their gowns are some six inches longer than the finger-tips, and in the cold weather the people wind these round their hands as a kind of glove. The long sleeves also perform the duty of handkerchiefs, towels, dish clothes and dusters! All too often wipe the dirty sleeves over the face and eyes, which accounts for widespread trachoma leading to blindness.

There is a perfect division of work between men and the women. Men care for the herds, ride them to the pasturage, protect them from wolves, hunt and trade and direct the plans of the family. The women, on the other hand, milk the goats and mares, attend to the cooking, look after the children and everything connected with the tent and home; when the camp moves, the women are responsible for dismantling of the tent, and for packing up. In times of urgency, however, they undertake all kinds of other duties to perform. From an early stage they help with the flocks as well as in the home. At the age of four or five they are good little riders, and when the family is

on the march it is only the babies who are carried in the cradle on the horses or camels. The nomad youngster has plenty of knowledge of their plains and practical training of hunting and herdsmanship, but has very little or no book learning as the Khirghiz often remark, "Why should we learn to read. It is enough for us to know about sheep and horses and cattle. What more do we want?"

At the early dawn, the women of the household rise first and start up the fire in the central part of the tent. Soon it warms up the *Yurta* that has grown cool during the chilly night. The men wake up, wrapped in clothes of fur, smoke their morning pipe until breakfast is ready. Tea mixed with flour, butter and milk and a little salt is taken, which keeps them hot all through the day. Roasted grain and dry cheese soaked in tea are eaten for breakfast, and also serves as food for the whole day.

Having finished the breakfast, they dress themselves and drive the sheep and cattle from the tents to the pastures. Herds often number several thousand heads of cattle, sheep, horses or camels. They form the chief wealth, and transactions are usually calculated in terms of heads of cattle. By sunset the family is reunited in the *Yurta*, and the animals in the camp. The dogs, fierce unsocial beasts, are let loose to protect the encampment, to warn the approach of thieves, wolves, or strangers.

The nomads' food is simple and from a modern view-point extremely ill-balanced. He has nothing during the day except his tea-soup. He eats little fruit and vegetables. Practically all his food is from his herds—meat, milk and fats; but he loves to crack and eat the seeds of pine cones and water melons. In the evening first of all tea is served, and then fermented mare's milk which forms the main item of diet. At a dinner party a great delicacy is the roasted fat and flesh from the tail of the sheep, and huge dishes of mutton stew. The liver is reserved for the elders. Bones are carefully picked and there is no waste. The evening meal usually ends with another round of *Kumis*. This is the ceaseless procedure day after day.

In spite of his lonely life the nomad is most hospitable. Hospitality, indeed, is part of his social and moral code. He pays the due respect of raising his hat and shakes hand and then puts his hand on his beard in prayer to *Allah*. They are very eager to get information from the traveller. The isolation accounts for their eagerness, and abundant leisure of the nomadic life accounts for the uncertainty with which a man puts off his work. No traveller may be turned from his door, and if the guest stays overnights, each day fresh horses are given to the travellers. The fact of abundance of animals is also important so that the usual

remark is not whether but, "How is your animal to-day?" "Has he a good gait?"

Horses and horse-riding are important. The greatest sport is the '*bagai*' in which men ride on horseback to hunt the black calf presented by a rich man for the sport. In the end they all indulge in a feast. A marriage, the birth of a son, the erection of a new *Kibitka* and a death are occasions for the '*bagai*'. It is a wonderful horsemanship. No woman is allowed to see or join the '*bagai*'.

The mode of life makes these people endure hunger, thirst, and fatigue as necessary accompaniments of long rides in search of stray cattle. He has no fear in crossing slippery passes and thus he learns to be self-reliant. The hardship of the nomadic life results in certain mental and moral traits as bravery, hardihood and unfortunately laziness.

Though the physical environment, religion, heredity, tradition and other unknown factors play an immense part in determining character of race, but these too in their origin and growth have been greatly influenced by physical environment. Islam inculcates seclusion.

In present circumstances the nomads of Asia are working out their destiny as a modern people under the Soviet regime, the Government has done immense good to them in making life comfortable and the country peaceful and safe by providing markets. It has added to their luxuries tea, sugar, bread, and cotton cloth, but will all these luxury goods be able to make them prosperous and happy in absence of their hereditary calling based on the regional pattern? It is still to be doubted.

2. ESKIMOS OF THE ARCTIC COAST

Compressing nearly half the globe round the Arctic Coast ranges a desolate region. It is a region of bleak mountain ranges and vast areas of intervening land with many lakes, some of them several hundred miles in extent. Devoid of vegetation other than peaty moss, lichen and low willows with a few varieties of wild flowers that bloom in the short summer season, these barren lands remain ice-covered throughout the year. The thousands of miles of coastline present a more uniform spectacle during the winter months. In these God-forsaken lands live the *Inuit* who are known to the world as the *Eskimos*, moulding their lives with the immediate context of the habitat. Due to the inhospitable nature of their country, civilization has not completely overtaken them as it has so many fine primitive races. They live even to-day largely by hunting and fishing as their forefathers did. In appearance they are a sturdy race, short of stature but well developed (generally from 5' 2" to 5' 4").

with the high cheek bones and dark brown slit eyes that seem to substantiate the claim that they are of Asiatic origin. They are a credulous people in a childlike way, possibly the result of a forbidding environment that readily lends itself to fantastic folklore and legends based on superstitious beliefs. Wherever man is found, he is dependent on and nourished by the earth. But it only supplies man with the bricks and mortar to build his life, but offers neither architect nor plan. It is for the man to decide. Eskimos by their simplicity and ignorance live in the great white silence. In the rigorous environment, he often looks it in the face. Starvation is no stranger. Successful hunting is his only means of good living. Peerless as a hunter the Eskimo is and he has mastered the art of hunting large animals with the least possible equipment that would undoubtedly discourage most native peoples. Among the implements in use are the harpoons, spear and bow drills. In the winter season Eskimo families congregate along the shore, or on the pole ice; here they remain until March or April. Seal hunting or what is known to the Eskimo as *manpok hunting*, (literally 'the waits') dominates the winter activity. The seals feeding fairly close in shore are compelled to establish breathing holes through the floes. These holes, concealed though they may be by a thin covering of snow, can be scented by the trained dogs today.

This enables the hunter to locate the blow hole and mark it with a bow; then he waits. When the seal comes up to breathe, and it may be a matter of hours he plunges his harpoon into the seal's mouth. In favoured stretches the seals are abundant, and the hunter has great skill in recognising a hole likely to be visited shortly, but to be in search of a good hunting ground within the space of the short daylight the camp must usually be established on the ice itself, for the hunter can rarely use his sledge or travel safely more than few miles from the settlement. Since it is difficult to obtain supplies for more than a few days ahead in winter, a period of severe blizzards or even fogs may bring a camp to the verge of famine. Death by starvation is a constant danger in the winter season.

The seal fuel is of immense use to the Eskimo. Its skin makes his clothes, blubbers his fuel, and its flesh, dried or boiled, his food. Wood is not available and seal blubber is far superior as fuel to the fat of the caribou, which is hunted in the summer, seal hunting is paramount to the neglect of the Caribou.

Winter activities are not confined entirely to seal hunting. The white fox-skin is now the most important economic commodity in the Arctic, and hunting activity throughout the year is, in part, a preparation for the fox-hunting season.

Spring arrives with surprising suddenness in the frozen Arctic circle. Warm winds and snow storms, with bursts of warm sunshine through breaks in the scurrying snow-laden clouds, combine to break the frozen grip of winter. Fish become plentiful on the Coast; the Eskimo families begin to scatter to hunt the seals in open water or to stalk them as they lie basking on the surface at their breathing holes. Spring is the great opportunity for stalking or *Utog* hunting. Heaving his sledge and team, the hunter advances with a hunting dog until he sights a group of seals. *Utog* hunting can for a brief season yield a far greater reward than the slow watching at the holes, and a skilful hunter may take several seals in a day. But after a few short weeks the floes begin to crack up, breaking into a number of slowly melting islands. During this period of abundance large stores of seal blubber are packed in hide bags and stored in pits for the rainy days. Spring is the most pleasant season of the entire year.

The weather is ideal, the large communities are humming with gossip; food is plentiful and the hunters relax in preparation for the summer hunting period.

The pleasant summer passes in fishing and Caribou hunting. As the fish move back to the lakes from the sea, the old fish traps are brought into use and some excellent hauls are obtained by the age-old method of trapping the fish in specially prepared sections of certain streams. Fish is the most dependable source of food in the Arctic and in the thousands of lakes it is sufficient to maintain a much larger population. Yet in this amazing country life is a continued struggle against seasonal food shortages. Distances are so vast, and the method of transport so slow, that privation is a common occurrence.

During these summer days, well-conditioned bands of Caribou wander at will as they feed on the thick Arctic moss. Though considerable hordes remain on the Tundra throughout the year, but in winter they scatter widely and are very difficult to approach. In summer, although individual hunting is common, but the herding habits of the caribou encourage group hunting, and the families which have scattered in the spring unite again before moving inland. Besides caribou smaller games are taken. Wolves and hares are caught in traps and snares, while the large summer flocks of duck and geese and other birds which migrate north to breed in the Arctic are struck down with light spears propelled with a spear-thrower, or taken in whale bone nooses.

During summer a number of edible berries and roots and vegetable material for other uses are also carefully collected by the women. But these are obtained only in relatively small

quantities, as luxuries and do not add very substantially to the diet.

As the Autumn season advances, the natives turn their attention to walrus hunting. This is considered to be the final preparation for winter, as the huge bulk of this unwieldy mammal yields a substantial return of good red meat which is required for food and dog-feed. The walrus is hunted amid the ice floes in a *Kayak*. At the beginning and the end of the winter, when the waterways are open, the Eskimos set forth in their Kayaks—skin-covered canoe is a striking example of Eskimo workmanship—armed with spears and harpoons. When the hunters sight the walrus basking on the edge of the floe, they cautiously beach their Kayaks on the ice, and harpoon the monsters before they can regain the water. The walrus puts up a stiff resistance, but is soon caught.

Polar bear hunting is eagerly anticipated and during early autumn, when bears haul out of the sea on to the young ice that scarcely supports their weight, they are in prime condition for the winter hibernation. As they make their lumbering way inland, the hunters and their husky dogs are ready for them. Before the introduction of firearms, Eskimo hunters armed only with a spear would meet and kill polar bear—the king of the North. Even to-day bear hunting is not without an element of danger and pain-maddened animals will sometimes attack a hunter; but modern high powered firearms have reduced the risk to a minimum. Although a bear's flesh is eaten, the animals are chiefly treasured for their fur.

In the life of the Central Eskimo there is thus a marked seasonal rhythm and clear-cut separation of the economic activities of the long winter season and those of the short summer. The separateness of a summer and winter occupation is recognised and enforced by a number of regulations. The sea mammals are fundamentally the more important, and manifest their dominance in myth and custom. No activities connected with caribou may be undertaken during the period of seal hunting; clothes are to be made from the summer's store of caribou hides, sealing must wait until they are finished, otherwise Sedna the mythological heroine of the Eskimo, from whose chopped off fingers the seals and walrus were created will be angered and wreak her vengeance with storms and withhold the seals and walrus.

The most striking feature of the Eskimo culture is the elaborate nature of their habitations, implements and weapons. Far from the primitive character of their economy and the severity of their environment resulting, as might have been expected in a low grade material culture, they make use of some of

the most elaborate devices known among primitive men, and their implements show amazing qualities of resourcefulness and ingenuity. They lack almost everywhere the wood which is so invaluable a material for most people of low economy; none, stone and hide, and even snow and ice, however, must take its place.

Of all the materials man uses to build his dwelling, snow must be the most peculiar; and its use as a sole material for house building is restricted almost entirely to the Eskimos. The snow *igloo* is an Eskimo invention to meet the dire necessity of adequate shelter in the region, where the severity of the winter lies in the length of darkness, and violent blizzards which sweep across the snow plain unrestricted by any kind of vegetation.

The Eskimo builds his igloo on the sea-shore or on an ice-floe. The living chamber may be four yards or more in diameter and about three yards high. It is circular or round in plan, and constructed in the shape of a dome. The Eskimo cuts large blocks of snow with a bone knife from drifts of fine-grained snow. These he lays spirally and leaving inwards, thus constructing a dome without support of any kind. The size, slope and inward inclination of each block is skilfully calculated by eye and the result is a very firm structure, despite the fact that an hour and a half is sufficient for one man to erect a temporary dwelling. The key block is carefully lowered in from the outside. All devices are then tightly packed with snow to complete the structure. Winter cold increases the solidity of this dwelling, the exterior freezing hard.

The interior is lined with skins held in position by sinew-cords passing through the walls. The air layer between the skins and the snow is a cold lining which permits a temperature of twenty degrees above freezing inside the room, but prevents this heat from reaching the snow wall itself. Consequently there is little melting inside the igloo. At the rear of the igloo where the Eskimo sleeps there are ledges and platforms covered with moss and skin.

Where several families are camping together a large chamber is often built as a meeting-place for singing and dancing and witch doctors' exhibitions, while several dwelling chambers built around are connected to it by galleries.

In spite of this, the summer settlements are encampments of small seal or caribou skin tents of a peculiar shape, with a ridge pole and a semi-conical rear. Variations of this single type are found throughout Eskimo territory from Greenland to Alaska.

The Eskimos live on a principal diet of fats and oils. During the cold winter they eat the fat meat of seals and whales, while in the summer they travel long distances to find deer, caribou, bears, rabbits and foxes. Fish are also caught in summer. Some of this meat is usually packed away for winter to provide variety in the menu. In the hunting season, when food is most plentiful, the Eskimo is apt to gorge. At the end of a successful hunt, a communal gathering may take place in one of the larger snow-houses of the villages. The meat, which may be walrus or perhaps seal flesh, is boiled, while fish may also be boiled complete with heads and tails. A small soap-stone bowl, in which seal blubber burns, with moss for a wick, is placed under the cauldron and gives sufficient heat for this form of cooking.

The Eskimos sit round and eat from the common cauldron; or cut hunks from the raw fount with their all-purpose knives. There is rarely any other form of table-ware, or even a table. Plates are unnecessary, and pieces of meat are passed from hand to hand, amid a hubbub of chatter. Every one present partakes of pieces of meat which come his way.

The clothing of the Eskimo is supplied mainly by the product of the summer chase, for caribou hide is warmer, lighter and more supple than seal skin. Where caribou fail, polar Eskimos living near the sea sometimes wear a sealskin costume which although ideal, is but inadequate for cold weather. Bear fur affords clothing for severe conditions. Eskimo garments are no shapeless warps. They are carefully cut out and tailored on established patterns for men and women. For protection against water and damp, water-proof suits of gut are made. The making of the complete outfit is the work of the women, who finely stitch and ornament the finished article, aprons, trousers, boots, caps and chin protectors. They have even devised slit goggles of ivory to protect the eyes against the glare of the snow.

The most interesting article worn by the coastal Eskimo is his sealskin boot. This is made entirely of black sealskin leather of which the hair has been removed. The seams of the shoes are double sewn with caribou sinew, while soles are made from the heavier leather of the bearded seal and the legs from the lighter skin of either the harp or the fur seal. The sole encases the greater part of the foot and as there is no heavy outer sole or heel, the wearer has excellent control of his movement on uneven ground.

Eskimos are very fond of winter travel and seldom miss an opportunity of accompanying a white man as a guide, even into territory with which they are unfamiliar. As a guide

the Eskimo has no equal, and when visibility is restricted to a few feet, with land-marks indistinct and even unfamiliar, he still retains a sense of direction that commands admiration. Sledge travel is extremely monotonous but it provides the slow mobility that suits the rough terrain of the Arctic. The behaviour of the dogs is often amusing, as well as exasperating. They are hitched on single traces in a fan-shaped formation, and the driver sitting on the sledge can wield the whip on the animals with good effect. Mean poverty is the lot of Eskimo hunters. Life is a constant war with nature, and acute discomfort is a normal reward. When the total benefit to be gathered from life is so small, it is surprising to find among the hunters so much happiness and so many of the finer human qualities. What explorer has not been astounded at the open-hearted hospitality of the Eskimo, at their eagerness to share their small comforts, even in time of scarcity? Eskimos even lend their wives to friends and visitors as a matter of elementary hospitality. This is only a friendly gesture. It is their contribution to the entertainment of visitors and show of a warmth of companionship to the strangers.

The women and children relieve the hunters of many of the routine duties of camp fire, secure small game to supplement and vary the diet. During early summer when elder ducks are nesting by thousands on the Arctic islands, they do most of the collecting of eggs. When the migrating ptarmigan alight to rest in the vicinity of the settlements, the youngsters make a valuable contribution with their small arms, bows and arrows.

They race, play a game resembling football and take interest in card playing, wrestling and the like. The children have their loboggans, they play hockey, and they play horse, though their fancied horses are dogs, for they have never seen a horse.

Culturally the Eskimos are very backward. Bathing has been practically unknown and they change their clothes when they tear to pieces. Eskimos are shortlived, due to the unclean habits and unhygienic manner of living. Now U. S. A. Government and American school teachers are succeeding a little in remedying these defects.

To life in general, with all its cruel hardships and bitter poverty, they show a quiet merriment which is strangely in contrast with their wretched surroundings. Though they live on the edge of the inhabited world, they show their sense of relationship with the rest of mankind by the name they give themselves—Inuit—meaning “men pre-eminently”.

3. PYGMIES OF THE CONGO BASIN

Civilization, it may be recalled, has developed only in those

parts of the world where a cold and dry season (a time of rest) has forced man to produce a surplus for the dormant period. Places characterized either by extreme poverty of plant and animal life or by extreme abundance have proved equally unfavourable for human progress. Wherever, man dwells he must conquer or at least tame all plant life; but where it grows continuously, he cannot do so and is forced to bow before it in defeat. So to say, such is the story of the God-forsaken Pygmies, who live in the environmental handicaps indicated above and struggle continuously—against excessive nature's menace.

The Pygmies (natives of the Congo Basin) who live on hunting and fishing typify the most primitive type of society. They are professional hunters and subsist for the most part upon their skill and upon the wild honey, fruits and roots they collect. They understand the forest as do no other Africans and are woodsmen *par excellence*. They possess an uncanny sense of direction and are as keen of ear and eye and agile and alert as a wild beast.

The Pygmies hunt with spears and bows and arrows, the tips of which are dipped in a poison which paralyzes the nerves of the animals but does not affect the meat. Pygmies are very clever with the bow and arrow and it is said that they can shoot four arrows one after the other, so quickly that the last arrow has left the bow before the first hits the mark. If the archer misses that at which he aims he loses his temper and smashes both bow and arrows. With their tiny arrows they kill the biggest animals, even elephants. They hunt only for flesh, and if they kill an elephant they usually throw away the tusks that we think so valuable. Besides arrows they use light spears but no shields. Most of their game is entrapped in nets in pits skillfully covered with vegetation and placed along the runways of the animals which invariably lead down to drinking places. They catch fish in streams with nets and baskets or with spears in pools which become isolated from the rivers. They have little idea of cooking and both flesh and vegetable foods are usually eaten raw, though they occasionally roast their meat over a wood fire in the open. They are particularly fond of bananas and occasionally make a kind of small village near the home of some tribe that lives on the edge of the forest and cultivates the ground. When they want any of the fruit they cut up one of the animals they have liked and tie the pieces of flesh to the tree. This they call paying for the banana and they can take as many as they want. The owners of the tree are so afraid of the little man that they leave the tree undisturbed for the Pygmies to use.

During eight months of the year the forest is a swamp, for the rain falls every day. It is then very hard to get food at all,

and the Pygmies then eat anything they can find rats, mice, and frogs etc.

Pygmies wear but little clothes. The men have a strip of cloth and the women a bunch of leaves. "They wear no ornaments not even flowers and feathers, but they are particularly fond of 'dressing up' in any fragments of European clothing if only they can obtain them."

They do not work except hunting and making arrows, nets, and traps. If they want fruit, roots, tobacco, knives or weapons they buy them from other tribes with the exchange of meat, skins, ivory, or feathers that they have obtained in the forest. As they grow nothing to eat, they always engage in the game of hunting, fishing and shooting and therefore are always on move. They always shift from place to place and whenever a large beast is killed instead of taking it to their camp, they move to it.

They do not build stony houses, as they seldom stay in one spot. Instead they make a kind of shelter like a large beehive. Thin branches are first stuck in the ground and then bent over at the top and fastened together. This framework is covered with creepers and plantains and plastered with mud. There is plenty of both leaves and mud in the great damp forest where they live.

Where hunting and fishing are the dominant occupation, population is always sparse, for any marked increase in human members would shortly bring about a corresponding decrease in fish and game. Seldom does the population exceed eight persons to the square mile and frequently it is not more than two. Wherever nature happens to be too lavish or too niggardly, man struggles vainly to secure a foothold. So the population of Pygmy tribes is considerably slender due to tribal wars, insani-tary and unhygienic modes of living, and periodic migration, taking a heavy toll of life among the young and old, and because the chief occupation is hunting, which never tolerates a dense population.

Everywhere the natives are grouped into tribes for protection against enemies and for getting food. Each tribe is under a chief and each lays claim to a definite area which it occupies. Seldom does it interlope upon the territory of a neighbouring group. It is his business to settle quarrels and to say, when the next move is made, where the new camp shall be pitched. There is nothing in the way of furniture in the huts. Men move often and carry all they possess, and do not want to be bothered with much property. They carry most of their small possessions in a string bag made of fibres.

The Pygmies are very tiny people, only about four feet

high but they are strong and brave. In fact they have to be strong and brave to live at all. They spend their life wandering about on land and so have never learned to swim, although there are plenty of streams and rivers. They get so much water from the rain that they want no more of it, if they can help it, and they neither use it for washing nor drinking. Because they are always in danger they have keen eyes and quick ears and are wonderful trackers of wild game.

Left solely to themselves, the natives would change little, if ever, and would remain much as they were when first encountered by white man. Nevertheless, they had adjusted themselves effectively if simply to this physical milieu, their wants of food, clothing and shelter were meagre and easily satisfied. They were happy and contented and knew of no mode of life superior to their own. Few natives possess any civilization in the modern sense. Some of them rank among the lowest human beings in the world. Most of them live precisely as did their ancestors centuries ago. Some have no religion, no idea of hereafter; others believe in spirits and myths and in the immortality of the soul. Some practise animism. They see spirits everywhere in nature—in the trees, the rocks and the rivers—and must continuously propitiate them. Fundamentally nearly all the tribes are socially similar though they have varying customs and ways of getting a living. All are ignorant and lack ambition to improve their lot. Some are savage, others tractable.

They have many habits which we do not like and they live in ways which do not seem very pleasant to us, but they do their best with the conditions in which they live and though they are very uncivilized we cannot blame them. In their places we should do no better perhaps, not even so well.

4. BEDOUINS OF THE HOT DESERTS

Among the sun-baked, hard gravelly plains, rocky hills, and sand dunes of interior Arabia, nomadic herding is almost the exclusive mode of land occupance. Because of the low rainfall, the vegetation is sparse and harsh. Perennial rivers are non-existent, drainage lines consist of dry stream-beds with an occasional water hole. In this inhospitable milieu dwell numerous small Bedouin tribes, who reveal a highly interesting ecology.

The Bedouins' whole existence centres about their domesticated animals and it is through these that they adjust themselves to the natural environment. The herds and flocks provide them with food, clothing, shelter, transportation, fuel and utensils. Hence, "the needs of the animals determine the mode of life."

The sparse vegetation necessitates constant move; accordingly the people are pastoral nomads. Each day the flocks and herds are grazed in a different farm from that of the previous day. Since within a few weeks, all the forage is consumed on those grazing grounds readily accessible from the encampment, frequent moves must be made to new localities some miles distant. The migrations are also seasonal. In the winter (the season of rains and hence of better pasturage) the tribes drive the animals into the borders of the Nefud desert, while in summer they take them southward into the high lands of the interior plateau or eastward into the less arid plains of Iraq. Hence, a tribe must have jurisdiction over an immense tract of land even though occupying but a fraction of it at any given time.

Because of the continuous wanderings there is a definite limitation on the type of dwelling and upon the possessions of the people. Homes are the tents. These are made of cloth woven from the hair of the goats and have a large number of poles. The ends of the cloth are fastened into the ground with pegs. Across the inside of the tent, cloth is stretched to divide it into two parts, one for the women and another for men. The floor is of clean sand, but at night rugs and carpets are put down on which to sleep. Most of the other equipment is obtained from the animals; rugs and clothing from wool; and other items from leather. Every item can be readily packed and moved with facility.

When it is time to move to another place the tent is taken down in a few minutes, the tent poles are tied together, and covers are rolled up, and the pegs and rugs are made into bundles. One camel kneels in the sand and is loaded with the tent and the poles; another is loaded with mats, cushions and bags made of goat skin. The women and the children ride on the camels, the servants walk and the masters go on horses.

The scanty pasturage resulting from the irregular desert rainfall provides only the barest margin of subsistence. Herding is the only source, which makes pastoral man nomadic. Under such habits of life, the flocks or herd must be kept small or it becomes unwieldy. By the same reason, the social group, which subsists upon the flock, must likewise be kept small. Desert nomads are then, as a rule, monogamous and their families are small. Often several families are grouped together in a related clan tribe. Members related to a tribe must act in concert in all affairs. Life which is simple and austere, is regulated entirely by traditional rules strictly enforced. Each tribe is under the leadership of a chief who is both capable and responsible. He makes the important decisions for the entire

group. It is he who determines when and where the group will move.

Often, in years of excessive aridity, the pasture fails locally and the nomad clans are reduced to famine. Under such conditions, pastoral man is faced with the alternatives of robbery or starvation, and quite naturally chooses the former. The starving nomads' raids are directed towards the perennially fruitful oasis, the laden caravan, or the more fortunate neighbouring tribe whose pastures are not desiccated. Desert man is never far from the margin of subsistence, but in excessively dry areas his numbers are seriously reduced by starvation or inter-tribal warfare. Thus "survival of the fittest," is a natural law operating upon man as well as upon the plants and animals. Since, the defectives and weaklings are periodically eliminated it is slight wonder that desert man is thin, wiry and enduring, possesses keen powers of sight and direction and can exist on scanty rations of food and water.

The desert gives him little, and to satisfy his wants he becomes a trader. He parts with his horses and he sells butter and also salt of which there are good supplies in the desert. In exchange of these things he gets flour, coffee, and clothes for himself and barley for his horse. Bedouin Arab can get his living also by acting as a guide and by driving camels.

It is necessary to settle down in one place if man is to produce anything, but it is necessary to move from place to place if man is to trade. The Negro settles to produce things; the Arab moves from place to place to take things that are produced from one place to another.

In the desert, among the pastoral peoples manufacturing is confined to the working of raw materials derived from their flocks and herds. The fabrication of leather goods, the spinning and weaving of woollens, and the looming of blankets, rugs, brocades and tapestries, constitute practically the only manufactural industries. Of special significance, other than these, are the salt making industry and sodium nitrate concentration.

Man, of course, in adjusting himself to an arid environment, has not developed direct modifications in structure and appearance as have desert plants and animals. He is far too intelligent and mobile for that, but he cannot escape making marked adjustments in his social, economic, and political ideas and habits. The outstanding trait of desert society is simplicity. Other types of climates furnish conditions which allow to adjust himself to his environment in many different ways. That is, the richness of such habitats results in complexity of socio-economic

development. But the dry environment of the desert regions is so limited in resources that man can make only a few adjustments. As a result, desert society is extremely simple.

The social law of the desert is hospitality and generosity. The richest among nomads exists on a slender margin and even he may find himself destitute at a moment's notice. Any unfortunate person, then is given alms, food and shelter. Frequently such a person is rehabilitated by collective gifts of animals and gear, because to do so is the best guarantee that the donors will be similarly treated should misfortune overtake them. In times of general calamity, however, each family or clan resorts to self-protection, and is ready to fight, pillage or kill for survival. Thus desert morality represents a close social adjustment to environment.

The desert environment has given the nomads the spirit of independence, "no enemy has ever followed them into the safe refuge of the endless desert, whose scanty wells are known to them alone."

In all probability, "life here is essentially the same as it has been for centuries and perhaps as it will remain for centuries more, it seems probable that extensive areas now occupied by nomads are finally to be taken over by crop growing peoples. The obvious reason for this prediction is that with the exception of a few small areas the nomadic herding lands are climatically unsuited to crop growing, chiefly because of low rainfall.

CHAPTER 19

RACES OF MANKIND

No two human beings are exactly alike, but all human beings are alike in many respects. The cells that make up the body are same for all people. A biologist can tell certain cells of a human being from those of any other animals, but he cannot tell the cells of an Englishman, from "those of a Chinese, a Negro or an American Indian." In the same way a biologist can tell human blood from the blood of lower animals, but all types of human blood are found among all stocks and races of man. For this reason, anthropologists say that there is only one race of people—*Human Race*. All human beings belong to one organic species called '*Homo Sapiens*'.

RACE A 'SOCIAL MYTH'

U.N.E.S.C.O. in a statement on 8th July, 1950, set forth the following main points from the conclusions of international panel of world's biologists, geneticists, sociologists, anthropologists, etc:—

- (1) Racial discrimination has no scientific foundation in biological fact. There is no proof that the groups of mankind differ in intelligence, temperament, or other innate material characteristics.
- (2) The range of mental capacities in all races is much the same.
- (3) Extensive study yields no evidence that race mixture produces biological bad results. The social results of race mixtures are to be traced to social factors. There is no biological justification for prohibiting inter-marriage between persons of different ethnic groups.
- (4) Race is less a biological fact than a social myth. As a myth it has in recent years taken heavy toll in human lives and suffering and still keeps millions of persons from normal development and civilization from the full use of the co-operation of productive minds.
- (5) Scientifically, no large modern national or religious group is a race. Nor are people who speak a single language, or live in a single geographical area, or share in a single cultural community necessarily a race.
- (6) Tests have shown essential similarity in mental characters among all human racial groups. Given similar degrees of cultural opportunity to realize their potentialities, the average achievement of the members of each ethnic group is about the same.

(7) All human beings possess educability and adaptability the traits which more than all others have permitted the development of men's mental capacities.

What is a Race?

"A race is a biologically inbred group possessing a distinctive combination of physical traits that tend to breed true from generation to generation." In other words a race is made up of persons who have a fairly definite combination of distinguishing physical traits which is handed from parents to children.

Three factors are embraced within the above definition: (i) inbreeding, (ii) distinctive combination of physical traits, and (iii) breeding true.

Inbreeding is the result of isolation and limited mobility. Isolation among men is the consequence of geographic circumstance and social inhibitions. Space and physiographic features are the primary geographic stimulators of inbreeding, e.g., North American Indians did not mate with Australians, because 12,000 miles of ocean separated them. The Polar Eskimos in north-west Greenland or the Samoyedes of northern Eurasia were so isolated that until their illusion was shattered by the arrival of Europeans, they thought they were the sole inhabitants of the world. Even in India, many aboriginals still hold their absolute sway in the interior hills and forest areas of India.

Social isolation is man-made. Human beings in general prefer to associate with their own kind. They incline to be suspicious of differences and to give warm approval to likeness of themselves. Consciousness of kind has its counterpart in a consciousness of difference. Endogamy (or marriage within the group) is a consequence of these two attitudes. The function of endogamy is to regulate marriage in a way that preserves the cultural identity of the group.

The effect of inbreeding is to intensify or narrow the distribution of genetic traits within a population. The physical characteristics of the individuals within the population then reveal a greater degree of standardization than is the case where there is a little or no inbreeding.

(ii) There is obviously considerable overlapping of single traits among the different races. Only the Negro has a distinctive lip. This means that a generalized lip form occurs in all other races. Black hair distinguishes the Negro from the blond Nordic but not at all from the multitudinous Mongolians. Thus the fact that any one of the physical traits found to be characteristic of a race may be found in other races has in itself neither positive nor negative significance.

(iii) There is no such thing as a pure race on the face of the earth today. Race mixture has obviated that possibility.

The Basis for Classification of Races. People in tribal society did not face many perplexing problems we have today in distinguishing the different types of human family. Today as migration has increased, the problem has also increased. At present race is used to cover a multitude of difference. We refer to any one who differs from us in colour of skin, colour or form of hair, to one who possesses a different culture, speaks a different language, or even belongs to a different government as being of a different race. Since such distinctions are entirely too superficial so we must seek a more definite basis for classification.

The criteria for the separation of the human family into races may be divided into two kinds: (a) The Superficial or external and (b) The Internal, skeletal or structural.

(a) *The Superficial or external basis.* This basis of classification includes such factors as the colour of the skin, colour of texture of the hair, colour and shape of the eyes and shape of the nose and face. These are direct, as well as old and most common methods for judging the races. In general there is a harmonic correlation between skin colour, colour and texture of the hair, colour of the eyes, and shape of the nose, but variations are so common that each should be considered separately.

(i) *Colour of the Skin.* All races have pigment but it varies in amount, consequently we vary in colour. It is a very defective method of judging because of the overlapping among the races. For example, Caucasian group varies from pinkish-white among North Europeans to light brown among the Western Asiatics. The yellow-skinned vary from very light-brown to yellow, to very dark brown or yellow among Mongoloid Asiatics, Americans, Bushmen. The Black-skinned vary from a dark chocolate-brown to a real black. Various shades of black are found among Australians, Melanesians, Negroes and Papuans. Very few of these are black.

(ii) *Colour and Texture of the Hair.* Hair may be straight, wavy, wooly, red or light brown. Smooth wavy and curly hair is found in Europe, Western Asia, North Africa, India, Australia and other localities where these people have spread. Straight black hair is characteristic of the people of Asia and American Indians. Wooly black are found among Negroes, grows very short among Negritos and Negrillos, a little longer among Negroes and long among Papuans and Melanesians. In Europe we find the greatest variety of hair colour, but here bulk of the people have dark brown or black hair.

Hair on the face and body is sometimes mentioned in the classification of races. Many sub-races have a scant beard or no beard at all and very little hair on their bodies. Heavy beards and hairy bodies are prevalent among Caucasians.

(iii) *The Colour and Shape of the Eyes.* The pigmentation of the iris varies greatly among races. Some shade of brown or black is the most common colour, but among North Europeans blue eyes are prevalent. Grey or hazel eyes are common among Central Europeans. Another eye distinction is in the fissure, slit or opening of the eye. The fissure is horizontal and normally wide among Europeans, but quite narrow in Asiatics. The opening is almond shaped among South Europeans and near Eastern people. The 'oblique', 'slant eyed', 'slit eyed' or 'Mongolian eyed' is characteristic of Asiatics.

(iv) *The Shape of the Nose.* Nose shape varies widely among people and even within the same race or sub-race. The nose may be broad or pinched at the root and the bridge may be high, medium or low. The nose may be long, medium or short, straight, concave, convex, aquiline or sinuous. The end may be rounded off, turned up, or slightly flattened. The nostrils may be broad, medium or narrow. The base of the nose may be depressed, horizontal or reflected. In general Caucasians have narrow nose, Negroes broad and Mongolians medium. The so-called 'Jewish nose' seems not to be typically semitic, but rather typical of the Hittites.

(v) *Shape of the Face.* The face usually harmonizes with the shape of the head so that a narrow face accompanies a narrow head. There are notable exceptions, however, for broad faces with long heads occur among Eskimos, and narrow faces with broad heads are common among the French Basques.

Some groups are characterised by a flat forehead, while others have a bulbous one. Some groups like Negro, are prognathous others like the American Indian, have prominent cheek bones. Variations, however, are common among almost all racial types.

(b) *The Internal Skeletal or Structural Basis.* While not disregarding the superficial or external criteria, later anthropologists have added the exact measurements of the bony skeletal part of the body, stressing the cephalic, altitudinal, nasal and stature indices.

(i) *The Cephalic Index.* The cephalic or cranial index measures the breadth of the head above the ears and expresses it in the percentage of its length from the forehead to the back. If we assume the length to be 100, the width is expressed in a fraction of this. When the ratio is below 75 the head is called

"dolichocephalic" (narrow head); if it is between 75 and 80 it is "mesocephalic" (medium head); and if above 80, it is "Brachycephalic" (broad head). Some Anthropologists make only two classifications. In that case all below 78 are termed "dolichcephalic" and those above 78 are "brachycephalic".

(ii) *The Altitudinal Index.* Realizing that some heads are well arched while others are low or flattened, and that the cephalic index did not measure this Anthropologists have added the altitudinal index. If the altitudinal index is less than 58 it is termed "platycephalic", if between 58 and 63 it is "orthocephalic", and above 63 "hyplicecephalic". While certain head shapes are more or less characteristic of races and types, we should remember that various shapes have existed since Neolithic times.

(iii) *The Nasal Index.* This means of classifying races is widely used and claimed by some to be the surest method of distinguishing racial types. The nasal index is expressed by means of the width (opening in the bony structure between the eyes) in relation to the length (measured from the root to the interior nasal spine). According to the greater or less breadth of the nasal opening in relation to its length, a person is known as "leptorrhinian" (long-nosed), "platyrrhinian" (flat-nosed) or "mesorrhinian" (medium-nosed). Those less than 70 are "leptorrhinian", above 85 "platyrrhinians", and between 70 and 85 "mesorrhinians".

(iv) *Stature.* Races and sub-races are often referred to according to height. Those classified as *Pygmy* are not over 58½" high. Groups classified as "short" are between 58½" and 62½", "medium", between 62½" and 66", tall, between 66" and 67½", and "very tall" over 67½". Within certain limits there is great variation among any racial type. Most of the Chinese are short but sometimes they are over six feet tall. Climatic, eugenic and economic conditions seem to have some effect on stature.

Races Classified. Just as there is disagreement as to the basis of classifying races so there is no absolute agreement as to a real classification. Boas makes a twofold classification, placing the Caucasian and Mongolian on one side and the Negro on the other. Linnaeus and Cuvier had three each, and Blumenbach five. Haeckel established twelve races in 1813 but increased the number to thirty-four in 1873. In 1878 Topinard found sixteen races but in 1886 nineteen. In 1889 Deniker found thirteen races and thirty sub-divisions, but eleven years later his classification included seventeen races and twenty-nine sub-divisions. This

gives some indication of how difficult it is for scientific men to classify races. One of the oldest classifications is on the basis of the three sons of Noah. This theory maintains that Ham, because of his 'mark' was the progenitor of the Negroes, Shem of the Semites, and Jepheth the rest of us. Cuvier (1769-1832) gave prominence to this theory and it still exists among certain religious groups. Linnaeus, writing in 1735 made three divisions of mankind: *Sakiens* (educated or civilized), *Ferus* (wild) and *Monstrous* (monster).

Blumenbach, writing in 1775, coined the word *Caucasian* in which he included Swedes and Arabs, and established a fivefold classification (i) *Caucasian*, (ii) *Mongolian*, (iii) *Ethiopian*, (iv) *American Indians* and (v) *Malayan*.

He described the *Caucasians* as having white skins, red cheeks, brown hair, narrow noses, oval faces, smooth foreheads and round skulls. (ii) The *Mongolians*, he pictured, as having yellow skins, straight black hair, small noses, narrow eyes, projecting cheek bones, and almost square heads. (iii) The *Ethiopians*, he described, as having dark brown skin, dark curly or wooly hair, broad noses, protruding lips, prominent upper jaws and long heads. (iv) The *American Indians* he pictured as a copper-coloured people having straight black hair, broad faces and skulls often deformed. (v) *Malays* he described as having chestnut brown skins, thick curly black hair, thick lips and broad noses.

This classification is often reduced to threefold one. In this case the American Indian is classed with the Mongolian and the Ethiopian. Indeed, the threefold classification is the one generally held today as being the most satisfactory. Yet for convenience the Anthropologists recognise the White, the Yellow and the Black as the three primary groups of human beings. Different writers divide these into numerous sub-races, breeds and stocks.

(i) The *White-group* or *Caucasoid* includes the white skinned, fair haired, tall Nordics; dark complexioned, dark haired stock *Alpines* and the small dark *Mediterraneans* with their dark skins and black eyes. One finds a wide variation of this type.

(ii) The *Yellow-group* or *Mongoloid* includes the Chinese, Japanese, Burmese, Siamese, Malays, Tibetans, brown Polynesians, American Indians, Eskimos, Finns, Lapps, Magyars and Turks.

(iii) Lastly the *Black-group* or the *Negroid* have the African tribes with all the divergences between the different *Pygmy*

tribes of Central Africa and the *Bushmen* of South Africa, the black fellows and *Melanesians*.

But this classification is not at all scientific at large.

F. H. Criddings fathered a theory that man arose in Southern Asia. There was a period when the human group was indifferentiated, the most direct projection of which is the *White race*. He believes the *White race* to be the most plastic and that it has come down from Palaeolithic times. As this race worked its way towards Europe, what is now the *Yellow-race* split off and settled in Africa, while the *White-race* migrated on into Europe. This classification is as follows:

1. *The Australian-African Group*. This group is characterised as having black skins and being *delichocephalic*, *prognathic*, with wooly or frizzly hair. It inhabits Australia and Africa south of the Equator.

2. *The Polynesian-European Group*. This group has fair skin straight or wavy hair, *mesocephalic*, *orthoganathic*. This group inhabits a broad zone from Polynesian north-west through south-western Asia, northern Africa and most of Europe.

3. *The Asia-American Group*. The group is characterized as having yellow or red skin, straight hair, narrow eyes, and being *brachycephalic*. It inhabits eastern Asia and Western America north of Equator.

He again divides the European part of the Polynesian-European race into two groups with two sub-divisions:

1. *The Eur-African Race*. Thisi racial type varies from brown to dark skin and has a relatively long head. (a) *The Baltic type* has fair skin, very light hair, blue eyes, narrow aquiline nose, long head and face and is tall. It inhabits north-western Europe, (b) *The Mediterranean type* has dark brown or black hair, dark eyes, long head and face, broad nose, medium or slender stature. It inhabits southern Europe, including southern Italy and France.

2. *The Eur-Asian Race*. This a round headed type, (i) *The Alpine type* has chestnut hair, large grey eyes, broad face, round head medium stock stature. It inhabits the Alpine highlands, (ii) *The Danubian type* has the blue eyes, light or red hair, broad face, round head is tall and heavily built. This group inhabits the northern Alpine highlands and the entire Danube valley.

Characters of the Eight Primary Types

Types	Head	Face	Nose	Prognathism	Capacity
Proto-Australiod..	Long Low ..	Medium Broad	Broad ..	Moderate	Small
Proto-Negroid ..	Long High ..	" ..	" ..	"	"
Mediterranean ..	Long Low ..	Narrow	Narrow	None ..	Large
Caucasoid ..	Long High	" ..	" ..	" ..	"
Mongoloid ..	Round Low	Broad ..	Broad ..	Moderate	Medium
Pale-Alpine ..	Round High	" ..	" ..	" ..	"
Ural ..	Round Low	Medium	Narrow	None ..	Largest
Alpine ..	Round High	" ..	" ..	" ..	"

We may say the human family is one, capable of being divided into at least three main divisions and numerous sub-divisions. Each race and each sub-division varies within certain limits in colour, head shape, and other distinguishable characteristics. The whole matter is somewhat confused and apparently far from settled. There is an approach to an agreement on the major divisions but difficulties increase when we try to place the sub-divisions or types under one of the major groups. So then it would appear that in the dim-prehistoric past the races started migrating and amalgamating forever wrecking any accurate classification. It may be pointed out that in percentages, world's population is about 43 percent Mongoloid; 33 percent Caucasoid and 24 percent Negroid.

Before the modern age of exploration and mass migration the great races of the world were highly localized. The Negroes were concentrated in Africa and the islands of the South-west Pacific. The Mongoloids held sway in Asia and North and South America. The Caucasians were limited to Europe, western Asia, Asia Minor, and North Africa.

(i) *Caucasians.* The white race is not white but relative to other races it is light coloured. Eye colour among Caucasians varies from light blue to dark brown. Hair is ash blend to black, of fine to medium texture; it may be straight, wavy or curly, but rarely kinky and never wooly. The males grow hairs on their chests, arms, legs and faces as well as on the top of their heads. The nose is narrow and high, rarely broad or flat. Although the forehead is usually sloping, the face is not pronathous. Chins tend to jut and lips are thin. Stature is medium to tall.

Within Caucasian race the Alpines are concentrated in the East Central Europe and Asia Minor. Recent migrations have distributed them in Western Europe, N. Africa and N. America in particular. They are brachycephalic (Cephalic index 83 to 88) and have broad faces with sharp square jaws. They are brunettes through and through; eyes and hair are brown to black; the skin is olive-hued. The nose is well padded with adipose tissue at the tip and it tends to be broad. The body is usually solid and heavy, rarely exceeding medium stature. Alpine men can grow fine dark beards; and if hair on the chest indicates masculinity, they have more of what it takes than any other Caucasians.

The Mediterranean is also brunette but unlike the stocky Alpine he is on the average slight of stature. His tendency is to be slight in youth and fat in maturity (this applies to female also). The race is dolichocephalic (C.I. 72 to 76) with narrow high foreheads, unmarked by any protrusion of a supraorbital ridge. Hair is black or dark, usually handsomely wavy and rarely straight. Although luxuriant on the head, it is sparse on the race, limbs and on the body. Eyes are brown, the skin is light brown or pale olive. Noses are narrow and high bridged. Spaniards represent the most commonly seen Mediterraneans in America. Some Britishers are Mediterraneans (specially Welshmen), but the bulk of the Mediterraneans are found in Iberian Peninsula, Egypt and Italy and among the Berbers of N. Africa.

The mean Nordic (statistically speaking) is low in pigmentation, his hair is bland (from twoheaded to light brown) eyes are blue; gray or hazel. Head form is dolichocephalic; the face is also narrow and angular. Jaws and chin are usually prominent; the nose is narrow and usually high. Hair is sparse on the body and thin on the head and usually falls out in adult males—a price a man must pay for being a Nordic. In form Nordic hair is straight or wavy but seldom curly. The characteristic Nordic is tall and slender. His body is relatively small but his legs are long. His chest is usually shallow and flat.

Nordic predominate in the populations of Scandinavia and the Baltic shores of Germany. Many representatives of this race are found in Britain and its dominions, and among the old population of United States. Nordic enclaves are also found scattered throughout Europe and North Africa.

(ii) *Mongolians.* The most populous of the present day races is the Mongoloid. The most outstanding Mongolian

physical trait is "slant eye". Skin color is brown or yellowish tan. Eyes are brown or dark brown, and the hair is as black as the Negro's. It is very coarse and straight, growing long on the head and shunning the face and body. Most Mongoloid populations are brachycephalic, but there are exceptions among the American Indians and Eskimos. The molars are broad and high while the nose is squat and low bridged, thus giving most Mongoloids a flat face appearance. In stature they are usually short and squat, due mostly to their short bandy legs, since actually their body trunks are fairly long.

The Mongolian proper are found in north, central and south-eastern Asia. The American Indians are predominantly Mongoloid.

(iii) *Negroes*. Negroes are the possessors of the darkest pigmentation of all mankind; nevertheless few Negroes are actually black. Most are dark brown or brownish-black in skin colour. Negro hair is prevailingly black coarse and wiry and tightly curled, kinky or wooly. Negro heads are with few exceptions long and narrow. The occipital region juts out as does the lower portion of the face which in appearance is accentuated by the thick, everted, mucous membrane that form the lips. The Negro nose is broad with flaring alae and a broad, deeply depressed bridge. The hair on the head though thick, is short in length, while the male beard is sparse and the body is not given to much hair growth. Stature is medium tall; the forearm is long; the legs thin (i.e., calves do not develop thick musculature); feet are flat-arched with a prominently protruding "lark spur" heel.

Originally he inhabited most of Africa south of Sudan and Egypt. But the seventeenth to nineteenth centuries saw the forced migration of several million Negroes from the West African Sudan to the New World.

East Africa produces a remarkable subvariety of Negro known as the Nilotic, who outdoes the Nordic in growing legs on a slender short body. He averages 6 feet 9 inch in height.

The oceanic Negro is a denizen of the south seas who first came to the attention of more than a handful of Americans when made landing the Solomans, New Hebrides, New Caledonia and New Guinea. Physically Oceanic Negroes are generally similar to African Negroes with these notable exceptions; the hair is more often and bushy, the supra orbital ridge is pronounced; the nose is prominent hooked and depressed at the tip; and the lips are thinner and less everted than the African's.

The Pygmy races of the world are all Negroid. The scat-

tered distribution of these little men indicate great antiquity for the race, which is found in small groups in the depth of Congo jungles, in the Malaya jungles of south-eastern Asia, in the interior of New Guinea and Philippines and on the Andman island of the Indian Ocean.

The Negritos are very small averaging less than 4 ft. 9 inc. Their skulls are mesocephalic with bulging foreheads, above which sprouts a tightly spiralled crop of close growing hair. They vary from blackish to reddish brown in skin color, but the hair is constantly black. Their noses are exaggeratedly flat and broad, and their facial prognathism is marked. Their little bodies are lightly muscled, and their stomachs are prone to be potbellied. All in all the physical endowment of the Negro is so meagre that it almost certainly has handicapped him in his precarious struggle for survival against the more powerfully built races of predatory men.

INTERMIXTURE OF RACES

Perhaps no racial question has caused so much acrimonious discussion as amalgamations. Indeed, it underlies practically all racial theories, and is the shibboleth which arouses the deepest venom of race prejudice.

Process of Amalgamation. There are two main processes of amalgamation: (i) Inter-racial marriage and (ii) Miscegenation.

Inter-racial marriage is the legal form of marriage and usually obtains where the groups are of the same or near the same colour and cultural standing. '*Miscegenation*', on the other hand, is the illegal amalgamation of two or more ethnic groups which usually differ materially in colour or culture. From the biological point of view and often from the psychological and social, miscegenation is marriage without legal sanction. It usually obtains by the men of the 'Superior' group taking the women of the 'Inferior' group as concubines and thus producing a half-caste group. Racial prejudice keeps the groups from marrying, but it is not strong enough to prevent the union of the sexes. Consequently, the men of the so-called superiors debauch the women of the so-called inferiors and then abandon their half-caste children to grow up in the inferior environment of the mother. The half-caste at first excites a certain amount of aversion or repulsion but later tends to remove the social bar between the two opposite groups and as the number of half caste increases the social barriers gradually break down and amalgamation becomes so great that the groups tend to form one people.

The Extent of Amalgamation. Some writers disregard all historical facts and condemn all racial crossings. Schults writes: "Nature prevents the development of the mongrel; in the few cases in which nature has for the time being success-

fully been outraged and a mongrel produced, nature degrades that mongrel mercilessly and in time stamps it out"¹

"Nature suffers no mongrel to live". It is generally agreed by the scholars of the world that such a thing as a pure race does not exist. There are some very backward tribes which have been isolated for a few hundred years; but a close examination of these shows that they are mixtures of earlier groups. If we study Chinese we find they are the descendants of at least two groups. Japanese represent the blending of three principal groups. The Hebrews claim to be the purest race, but their purity is more in religion than in blood, and even in religion there are several sects. Greece was composed of three groups and Germany is a union of Nordics and Alpines which are the components of earlier groups.

The population of the world today appears to be but a mixture of earlier groups. Our present so-called races are all mongrels resulting from the crossing of earlier groups. Pure races are non-existing and the purest of the races of earlier groups have never accomplished anything. The Eskimos, Fuegians, Gypsies and Pygmies are perhaps the purest racial groups we have and they have never produced a civilization worthy of the name. Todd says, "A pure race is the Holy Grail of physical anthropologists. We are all mongrels. Successive inundations of invaders have 'corrupted' their blood and modified their population types, and the process still goes on, less noisily perhaps, but no less surely."²

Wherever we go today, we find an amalgamation of the races progressing rapidly. In Europe it is between Nordics and Alpines, Alpines and Mediterraneans, Teutons with Slavs and Latins and all these various groups with Jews. In America we have representatives of all the so-called races of the earth coming together, amalgamating and forming themselves into one people. In China, Japan, Hawaii, Mexico and elsewhere there has been a rapid progress in the amalgamation of Orientals and the Occidentals. In Africa the different Teutonic and Latin groups are amalgamating with the numerous native tribes. As commerce and transportation continue to develop we may expect amalgamation to increase in like proportion.

Race Superiority. Science does not support the claim that some races are biologically superior or inferior to others. Civilization of any race may be advanced or retarded and the people within them may have greater or smaller opportunities for contact and for personal development. People, who live in an advanced civilization, regardless of race or stock, develop much more rapidly than people who live in a retarded civilization. But this has nothing to do with abilities or aptitudes.

1 *Race of Mongrel*, p. 4.

2 *Theories of Social Progress*, p. 314.

CHAPTER 20

THE FORMATION OF RACES

"Origins of human races are wrapped in mystery, and the early wanderings of peoples are not much more definitely known. Nevertheless the subject is as fascinating as it is difficult, and many are those who, from interest or sheer intellectual curiosity, have sought to push aside the curtains of ignorance that shut from our view the comings and goings of men in the most ancient world".¹

The diffusion of the human family into races took place so far back in the darkness of prehistoric ages that a solution seems well nigh impossible. Authorities speculate concerning this baffling problem but since facts cannot be collected and observed we have to rely mainly on hypothesis and inferences. "We know very little", says Kroeber, "about the causes that change human types; and we possess only incomplete information as to the history of races. Stray bits of evidence here and there are too scattered to afford many helpful clues. The very earliest man, as we know them from fossils, are too far removed from any of the living varieties, are too primitive, to link very definitely with the existing races, which can all be regarded as intergrading varieties of a single species, *Homo Sapiens*. In the latter half of the old Stone Age (in the Ordovician period) at a time estimated to have been from twenty to twenty-five thousand years ago, we commence to encounter fossils which seem to foreshadow the modern races. The so-called 'Grimaldi type of man' from this period possesses Negroid affinities, the contemporary *Cro-Magnon* and perhaps *Brunu* types evince Caucasian ones. But we know neither the origin nor the precise descendants of these fossil races. They appear and then vanish from the scene. About all that we can conclude from this fragment of evidence is that the races of man as they are spread over this earth today must have been at least some tens of thousands of years in forming. What caused them to differentiate, on which part of the earth's surface took on its peculiarities, how they further subdivided, what were the connecting links between them and what happened to these lost links on all these points the answer of Anthropology is as yet incomplete."²

In trying to account for the development into races we are, forced to take one of three views: *first*, that man rose simultaneously in different places, localities, or continents; *second*, that

1 Case C. M., *Outlines of Introductory Sociology*, p. 201.

2 *Anthropology*, pp. 34-35.

he began existence with such wide variations and aptitudes that he made his way into the environment suited to his desires; or third, that he began as one group and migrated into different sections where the physical environment produced those differences which characterised races of today. The last named theory seems the most plausible and generally speaking is the most widely accepted. In the formation of races three stages are recognised:

1. The specialization of the human form;
2. The evolution of varieties; and
3. The maintenance of these varieties.

1. *The Specialization of the Human Forms.* Just when and where man began to develop his specialised form will doubtless remain a mystery. It is now widely agreed that man's earliest home was in Asia, although it may be possible that Kean's submerged continent may in time become more acceptable. At any rate, we are reasonably sure, he did not assume human form in Europe. "It would seem," writes Carr-Saunders, "that the pre-human ancestor of the *Miocene* and *Pliocene* was probably rather an obscure member of the private stock retaining generalised features. Somehow without specialization, he managed to survive—possibly in some very limited area. When the rapid evolution of bodily form among the mammals had slowed down, the only specialization in which the pre-human ancestor had indulged began to stand him in good stead. That it carried him as far as it did—to the dominion over all living things—was made possible by the fact that his bodily form was not specialised but was capable of being turned into an instrument of the mind. The evidence seems to indicate the late *Pliocene* or early *Pleistocene* as the era when man began to develop along this path.

In this context, it would be interesting to note the following geologic ages and the forms of life associated with them³:—

Eras	Periods	Duration of Periods	Period Started B.C.	Dominant Life
Cenozoic	Pleistocene ..	1,000,000	1,000,000	Man
	Pliocene ..	6,000,000	7,000,000	
	.. Miocene ..	12,000,000	14,000,000	Ape
	Oligocene ..	16,000,000	35,000,000	

³ E. A. Hoebel, *Man in the Primitive World*, 1949, p. 13.

	Eocene	..	25,000,000	60,000,000	Mammal
Mesozoic	Cretaceous	..	65,000,000	125,000,000	
	Jurassic	..	35,000,000	160,000,000	Reptiles
	Triassic	..	35,000,000	195,000,000	
	Permian	..	25,000,000	220,000,000	Amphibian
Paleozoic	Carboniferous	..	85,000,000	305,000,000	
	Devonian	..	50,000,000	355,000,000	Fish
	Silurian	..	40,000,000	395,000,000	
	Ordovician	..	85,000,000	480,000,000	
	Cambrian	..	70,000,000	55,000,000	Invertebrate
Protozoic	Precambrian	..	650,000,000	1,200,000,000	Metazoa
Archeozoic	Precambrian	..	650,000,000	1,850,000,000	Protozoa

"With regard to the bodily evolution of man the first detailed knowledge we have is of the *Neanderthal race*. We know that Neanderthal man lived in the fourth glacial period. This race was living in Europe about 50,000 years before Christian era. Before this epoch we know nothing of human bodily evolution except from three imperfect specimens which we cannot assign definitely to any period in the *Pleistocene* beyond placing them before the middle *Palaeolithic*. No definite conclusions can be drawn as to the relation of these forms one to another, or to the forms which follow. Human remains of this race were first discovered in 1857 near Dusseldorf (Germany) in Neanderthal, after which this human type has been named.

"*Pithecanthropus* (or Java man) may or may not be on the direct line leading to all the higher races. He is believed to be the earliest man-like animal. Held to be a creature about midway between orang-utang and man. There is some probability that *Heidelberg* man is a forerunner of Neanderthal man, whereas *Eoanthropus* would seem to be related on the one hand to the hypothetical Pliocene ancestor and on the other hand to the late and not to the Middle Palaeolithic races. It is quite possible that as Europe was not the scene of human evolution, *Pitldown* and *Heidelberg* man represent varieties which have died out, and not stages from the main line of human evolution. This is certainly the case with the Neanderthal race. In the

upper Palaeolithic we find races of as high a physical type as those of the present day, but we have no certain knowledge of their direct ancestors"⁴

While Carr-Saunders thinks man first assumed his human characters in the late Pliocene or early plistocene, Rev. E. O. James concludes "that man evolved from a common precursor early in the Pliocene epoch contemporary with pre-chellean implements. From this common ancestor two stocks were produced in Europe—the Neanderthal and the Eoanthropus, Galley Hill—*Cro Magnon* species of the human organism. Towards the end of the glacial period the Neanderthal type became extinct while the Piltdown—Galley Hill race survived as *Aurignacian* and *Cro-Magnon man*. On this hypothesis, the remains found at Grimaldi may represent a fusion between the types in Europe at the latter part of the Pleistocene epoch".⁵

2. *The Evolution of Varieties.* Passing from the time and place when man first began to assume his human form we come to the evolution of varieties. The remains of primitive man seem to show that quite early there was an evolution of varieties of human beings. Carr-Saunders thinks it was in the intermediate period which was of relatively immense length that man changed from an arboreal to a terrestrial existence, adopted an upright position, wandered into new climate zones where natural lethal and sexual selections were accomplished. These things favoured the evolution of varieties. "We are ignorant as to the physical characters of man at the close of the intermediate period, but we know that in the earlier part of the upper Palaeolithic there was existing one variety—the Grimaldi race—which bears certain resemblances to the Negroid type, and that in the latter part of the same period there were existing several varieties closely resembling types of modern European man. It seems, therefore, that, so far as this period is concerned, we have to account not merely for the evolution of the main types but also for the evolution of the less easily distinguishable varieties of man. The splitting up may have begun in the former period but it probably did not go far".⁶ He concludes "that the great changes in human bodily form were accomplished in the intermediate period when the splitting up into varieties may also have begun. This splitting was continued in the first period and the modern types were formed before the end of that period."⁷

"The hundred or more millennia of lower Palaeolithic time rolled slowly away," writes J. M. Tyler, "Upper Palaeolithic

⁴ *The Population Problem*, pp. 129-130.

⁵ James E. O., *An Introduction to Anthropology*, pp. 214-215.

⁶ *The Population Problem*, pp. 3, 70, 71.

⁷ *The Population Problem*, p. 381.

time covering the final retreat of the glaciers ushered in a new people and race which seems to have very largely replaced the Neanderthal folk. The new Cro-Magnon race was a different physical and mental type and represented the noble savage. It is the wonder and admiration of all students of prehistory. They were tall, agile and vigorous, with high foreheads and strong features, and would have made fine models for the sculptors today."⁸

3. *The Maintenance of Varieties.* With the evolution of varieties began the shaping of types. Somehow, through climatic and other selective forces and adaptations, certain racial types emerged and managed to retain general racial characteristics. Carr-Saunders thinks that the chief characteristic "of the first and second periods was the maintenance of types evolved, though this was interfered with by migration which brought about elimination of certain types, racial mixture and further climatic adaptation. Finally, in modern times there has been a lessening of the stringency of selection, which previously tended to maintain the existing varieties, and a turning of lethal selection to the building up of immunity against diseases".⁹

"The extraordinary variability of modern man", writes Carveth Read, "(considered as one species) in stature, shape of skull, size and power of brain, colour, hairiness, quality of hair, and other characters, physical and mental, may be referred chiefly to his having become adapted to various local conditions upon settling here or there for long periods of time after wandering over the world in quest of game. The settling of offshoots of the original stock in regions long enough for them to undergo adaptation to local circumstances is the explanation of existing races: the Negro adapted to equatorial Africa, the Asiatic Stock 'Mongolian' to Central Asia, the Mediterranean race to the neighbourhood of the sea after which it is named. As to the Nordic sub-race (of the Mediterranean, we may suppose), with its fair hair and skin, it has the appearance of an Arctic beast of prey like the polar bear. The snow-leopard of the Himalaya is found at a midway stage of such adaptation. Some geologists and zoologists now believe that during the glacial period, the climate of Northern Europe was not everywhere such as necessarily to destroy the local fauna and flora, and in that case our ancestors may for ages have maintained themselves there, or, if that was impossible (as the absence of palaeolithic remains in Scandinavia seems to indicate), they may have roamed for many ages along the borders of glaciation, perhaps as far as the Pacific coast. Chinese annals refer to fair tribes in Eastern Siberia 200 years before the Christian era; and

⁸ Marshall Jone, *The Coming of Man*, p. 51.

⁹ *The Population Problem*, pp. 381-382.

it seems requisite to imagine some extensive reservoir of mankind in order to explain the origin of the vast hordes which in pre-historic as in historical times again and again invaded Europe...."¹⁰

From the preceding discussions we see that we really know very little of the evolution of early human beings. According to Kroeber, the *Grimaldi*, *Cro-Magnon* and perhaps *Brunu* types appeared some twenty to twenty-five thousand years ago, and the present races were some tens of thousands of years in evolving. As indicated before, the common view is that man evolved and began his variations in Asia and spread over the world in Palaeolithic times. There is practically no evidence of the evolution of the human form in Europe. If he arrived there during the great Ice Age, as evidence seems to warrant he had already taken definite shape. There are evidences however, of an inter-glacial man who arrived in Europe, sometime during the glacial period or Great Ice Age. In Pleistocene times Western Russia, Scandinavia, Scotland, Northern England, and Germany as far south as the Hartz Mountains were covered with glaciers. On the south the Alpine glaciers extended northward leaving part of eastern Russia, a strip through central Europe, the southern part of England, and a boundary on the north shore of the Mediterranean, in which man could survive. During the third inter-glacial epoch England was perhaps joined to the continent and it was evidently during this time that man spread there from France. At any rate, it would appear that thousands of years ago, man evolved, spread over the world, differentiated by adapting himself to conditions and thus produced the racial groups of today.

FACTORS RESPONSIBLE FOR RACIAL DIFFERENCES

Although Carveth Read infers from the whiteness of children's hair that the race was formerly fairer than now, the consensus of opinion among Anthropologists seems to be that primitive men were very much alike and were dark in colour. "If therefore," writes W. Z. Ripley, "as all consistent students of natural history hold today, the human races have evolved in the past from some common root type, this predominant dark colour must be regarded as the most primitive". Ripley thinks it is inconsistent "to suppose that ninety-nine percent of the human species has varied from a blood ancestry, while the flaxen haired Teutonic type alone has remained true to its primitive characteristics"¹¹ Taylor contends that since so many of the "dark races are lighter at birth and lighter on unexposed portions of

¹⁰ *The Origin of Man*, p. 19.

¹¹ *The Races of Europe*, pp. 465-466.

the body, it is possible that early man was a dark brown or red brown colour".¹²

The head shape and stature of primitive man were evidently very similar to those of modern man. It is known that Palaeolithic man had a long head, but by the end of the Neolithic epoch round heads had become quite common. Cro-Magnon man appeared as a tall race in contrast with the shorter races. Throughout this long prehistoric age man had been wandering into different climates and other conditions where the environmental influence played upon him and caused him to change and adjust himself to prevailing conditions. Somehow "he made his way to every quarter of the globe; and when he got there though needing time, perhaps, to acquire the local colour, managed in the end to be at home".¹³

A number of theories have been proposed to explain the evolution of the physiological characteristics of races, and without doubts there have been many contributing factors; yet, it would appear that the theories can be grouped under three chief heads: 1. Climate, 2. Racial mixtures and 3. the functioning of the glands.

1. *Climate*. Undoubtedly climate has played an important part in the development of certain racial characters. If we make use of the hypothetical contrast of the passionate Mediterranean with the phlegmatic Teuton, or the vivacious Negro with the Stoic American Indian, we notice that there are other differences besides colour and shape of the head and these seem to continue. Unquestionably part of these can be explained on the basis of culture, but then we have to explain the origin of the different cultures. Race, therefore, appears to be a consequence of conditions rather than a cause of differences and the general explanation has been climatic influences. For a long time it was accepted without question that pigmentation was a direct result of climate, but according to Dixon this thesis "can in the light of our present knowledge, no longer be maintained."¹⁴

Binot thinks that "colour is the direct effect of the milieu."¹⁵ Woodruff concludes that "man is invariably covered with a pigment which acts as an armour to exclude the more harmful short rays, and moreover the amount of pigment is in direct proportion to the intensity of the light of the country to which his ancestors have proved their adjustment by centuries or mil-

12 *Environment and Race*, p. 33.

13 Marett, R. R., *Anthropology*, p. 117.

14 *The Building of Cultures*, p. 8.

15 *Race Prejudice*, p. 104.

lenniums of survival in health and vigour....undoubtedly the Negro, when in the shade, is able to radiate heat better than whites and this enables him to keep cool in the tropics, but puts him at a disadvantage in the north where a white man can keep warmer with less clothing and less fire in the house. But it is a secondary cause enhancing the first because when it comes to a question of light and cold, nature makes no mistake but selects a colour to exclude the light. Hence in all cold, light countries, i.e., steppes plains and the arctics, there is pigmentation of a colour in the lower end of the spectrum, red or yellow, with variations of brown olive or copper....All these red and yellow colours undoubtedly enable the native to conserve his head almost as well as the white man and at the same time, exclude the dangerous short waves."¹⁶

Huntington maintains that human evolution for a half million years or more "has been chiefly guided by two sets of facts namely the mutations that have occurred in man, especially in his skull and brain, and migration and natural selection under the influence of great pulsations of climate."¹⁷ Semple believes "we can hardly err in attributing the great lung capacity, massive chests, and abnormally large torsos of the Quichua and Aymara Indians inhabiting the high Andean plateaus to the rarefied air found at an altitude of 10,000 or 15,000 ft. above sea level."¹⁸ East asks "why are these black peoples, yellow peoples and white peoples? It is because in early times families left the patriarchal fire side, wandered away in various directions and established themselves in different climes. As time went on, some of their many hereditary units changed, and thus produced numerous variations, both physical and mental. When these variations prevented or deterred their possessors from fitting along life's high way and leaving descendants, they disappeared leaving no record of their existence. Their germ plasm with its peculiar qualities ceased to exist, just as perhaps did the germ plasm on which depended the wonderful combinations of qualities which gave a Golden Age to Greece. But some of these changes gave their holders a handicap over the others in combating the environment in which they found themselves. They persisted, outbred the older type, increased in numbers and founded new strains of mankind. There is definite evidence that thousands of such differences now separate the primary races; though it is obvious that hereditary units presumably much more numerous, are common property of all."¹⁹

Some writers, while assuming that all the different races

¹⁶ Rebman, *The Effect of Tropical Light on the White Man*, p. 85.

¹⁷ *The Character of Race*, p. 39.

¹⁸ *The Influence of Geographic Environment*, p. 34.

¹⁹ *Mankind at the Crossroads*, pp. 30-31.

of man are derived from a common stock, claim that racial characters did not become prominent at first. They think that the first differences developed very slowly, and did not assume importance until about the beginning of the nation-making or historic period. Carr-Saunders believes "man spread into various climatic zones before the beginning of the first period of history. The consequences of this spreading of man must have been twofold. Mankind became segregated into groups, the surroundings of which differed, first in that they were subject to different modes of life".²⁰ Haddon goes a step further when he says "there seems to be good evidence that climatic conditions have indirectly become impressed on the germ-plasm so that definite responses have become heritable. In any case natural selection, or rather elimination, has always been at work and combined with isolation areas, has produced stocks with certain associated characters, and it is to such stocks with certain associated characters that the term 'races' can be applied."²¹

2. *Racial Mixtures.* Some authorities stress the effects of racial mixtures in the development of racial differences. Undoubtedly Palaeolithic and Neolithic men met, fought, conquered, interfered and amalgamated, giving rise to new types. Dixon says, "From the complex fusion between these archetypes, or fundamental races modified by environment especially in outward characters of pigmentation, hair etc., the existing actual races might be described as stable blends, have been derived."²²

"A considerable mixture between different races, stocks or whatever they may be called", writes Haddon, "has doubtless taken place at all periods, hence it is extremely difficult to determine whether the modifications from the supposed average type of given people are due to inherent variability, to reactions to the conditions under which they are living or have previously lived, or to race mixture.

"A racial type is after all but an artificial concept, though long continued geographical isolation in areas of characterisation does tend to produce a general uniformity of physical appearance. There are, however, groups of intermediate characters that it is often very difficult to classify them. These may be due to racial mixture through long period of time, but we must always bear in mind that they may be undifferentiated stocks, relics of early man, who have not acquired distinctive traits in areas of characterization."²³

20 *The Population Problem*, p. 371.

21 Haddon, *The Races of Man*, p. 150.

22 *The Racial History of Man*, p. 502.

23 Haddon, A. C., *The Races of Man*, pp. 150-151.

3. *Functioning of the Glands.* Sir Arthur Keith explains racial differences on the basis of the degree of functioning of the different glands. The greater activity of the pituitary gives the Caucasian his height of stature, bulk of body, prominent chin, strong eyebrow ridges, and pronounced nazalisation. A lessening of the thyroid gives greater pigmentation of skin, less amount of hair on the body, flattened face, bulging forehead and flattened root of the nose, characteristics of the Mongolian and to lesser degree of the Negro. A greater activity of the interstitial gives the Caucasian a more robust appearance, a quicker development of physical character, and an abundance of hair on the body. The suprarenal glands help regulate the growth of body and pigmentation of skin. The pineal gland is also concerned with body growth. If the functioning of the glands is basic in explaining racial differences, we still have the problem of explaining why they are more active among some races than others. Some, however, have endeavoured to explain this on the basis of geographic factors.

In conclusion, *we may say that Finot, Woodruff and East stress the influence of geographic factors on the pigmentation of the skin; Huntington and Semple on the body form; East and Haddon, the gradual impression of these influences, on the germ-plasm, while Macdoughall and Carr-Saunders think the modes of living have been influenced by climate and in turn have themselves become influences. Dixon and Haddon stress racial mixtures also as contributing factors, Huntington mentions mutations but to Keith the glands are a sufficient explanation.*

Primitive man evidently wandered from his cradle and grew up with definite characteristics stamped upon him through thousands of years of dwelling in relatively isolated localities. "When history began", asserts Chapin, "Men found themselves already possessed of those characteristics of skin, colour, hair, form, and head shape, which serve as the marks of race."²⁴

Climate undoubtedly played an important part, indirectly at least, in formation of races. It has been comparatively easy to account for pigmentation, colour and form of hair, and colour of eyes, on the basis of climate, but the shape of the eyes, nose, jaws, and head has not been so easily explained. Perhaps the way people lived and made their living, variations, mutations, racial mixtures, periods of isolation, and the functioning of the different glands should all be considered as contributory factors in the formation of racial types. Even then it is not easy to explain the colour of the Eskimos and account for the blood peoples who have dwelt in Africa for thousands of years. It would

²⁴ *An Introduction to the Study of Social Evolution*, p. 205.

²⁵ *Environment of Race*, p. 10.

appear that it takes thousands of years for the characteristics of a race to develop but once developed they continue for very long periods even in a changed environment, unless racial crossing takes place.

EARLY WANDERINGS OF RACES

It has been stated that man wandered to practically all parts of the world in *Palaeolithic* times. Taylor thinks that Asia is "*the cradle-land of the peoples of the world*. The great migrations have been thrust out of Asia in four great waves during the million years of *Post-Pliocene* time. An attempt is made to correlate these thrusts with the four advances of the great Ice-sheet from the Pole which occurred within the same period."²⁶ He maintains that *Neanderthal* man moved out of Asia after the second Ice-Age and reached Europe during the third Ice-Age; and that the third Ice-Age drove the earliest Iberians out of Asia and they appeared in Europe as *Cro-Magnon* before the Last Ice-Age. "A series of zones is shown to exist in the East Indies and in Australasia, which is so arranged that the most primitive are found farthest from Asia, and the most advanced nearest to Asia. This distribution about Asia is shown to be true in the other 'peninsulas' and is of fundamental importance in discussing the evolution and ethnological status of the peoples concerned".²⁶ He says that regardless of "whichever region we consider," Africa, Europe, Australia or America, we find that the major migrations have always been from Asia. The dominant feature of its ethnology is the solid mass of broad-skulled peoples in Central and East Asia. A great wedge of these folk projects into Europe and constitutes the European Alpine peoples. A somewhat similar wedge of peoples projects down the 'corridor' of migration along the western side of the Americans. A third wedge reaches south from China into the East Indies. All round the migrations of these broad-heads we find a 'shatter-belt' of long-head peoples. Thus on the south it extends from the Alps through the Caucasus and Himalayas to the Indonesian Islands of Melanesia."²⁷

Dixon gives a lucid description of the races and their wanderings. He divides early man into eight types: Proto-Australoid, Proto-Negroid, Mediterranean, Caspian, Mongoloid, Palae-Alpine, Ural and Alpine. While each of these groups had a more or less definite territorial spread some extended practically all over the earth, consequently there has been much overlapping of territories.

1. *Proto-Australoid* had a short stature, was *dolichocephala-*

²⁶ *Ibid.*, p. 8.

²⁷ *Environment and Race*, p. 10.

lic, had a brown skin and straight or slightly wavy dark hair. The skin became black in southern latitudes and light in northern. The hair also changed and become 'kinky' in southern latitudes. From the centre of dispersion, which was tropical Asia, especially the south-western part including Java, Sumatra and Borneo, it went south-east into Australia; west passing through India and the north African coast into Europe, where it composed the majority of the early *Palaeolithic* people and introduced the rudiments of civilization, especially tool-making, the use of the fire and clothes, and the rudiments of religion, north and east into America. In northern Europe it crossed with the Caspian and was an element in the formation of the so called "Nordic" group. The Negro slaves introduced into North and South America contained elements of this race. Its chief strength in the New World, however, was among the *Iroquois* and southern *Algonkian* tribes of North America. *Mixed with the Proto-Negroids it is prominent in Africa, southern and north-eastern India, and other countries around the Indian Ocean.*

2. *The Proto-Negroid.* group was *dolichocephalic*, tall with dark brown skin and curly or frizzly hair. The skin and hair lightened in northern latitudes. From northern and western Africa this group dispersed throughout Africa; east to Polynesia and Australia, passing through India, southern-eastern Asia, Melanesia, and Indonesia north into western Europe; and north and east to America. Although the *Proto-Negroid* is more definitely a child of the tropics than the *Proto-Australoid*, is more permanently settled around the Indian Ocean, and is apparently a younger group, it largely drifted with the *Proto-Australoid* and blended with it. In the Baltic region of Europe it also mingled with the Mediterranean and Caspian groups, thus helping to form the Nordics. In the New World it was mixed with the *Iroquois*, southern *Algonkians*, tribes along the Mexican border, Brazilian Highlands, and in Patagonia. Today the *Proto-Negroid* is dominant in western Africa, northern Australia and in parts of Melanesia. Mixed with the *Proto-Australoid* it forms the bulk of the Negro group of today and forms a strata for the so-called Malay groups. There are very few traces of the *Proto-Negroid* group in Europe although at one time it was prominent along the northern Mediterranean coast and in the Baltic region. It probably invaded Europe in *Palaeolithic* times. It undoubtedly crossed with other groups but its colour has largely been "bleached out" today. There really seem to have been two sub-types of the *Proto-Negroid*, one much darker than the other. *This group has been quite influential in several countries, and mixed with the Proto-Australoid and Caspian groups, has played a prominent part in the history of Egypt.*

3. *The Mediterranean group* was short *dolichocephalic*, with a brunette skin, and dark hair. From the eastern Mediterranean and Black Sea regions this group spread into Arabia, northern Africa, Southern Italy, Sicily, Sardinia, the Iberian Peninsula, Great Britain and the west coast of Norway, chiefly following the Caspian and amalgamating with it. Next to the Caspian it is the most important element in the Nordic blend. It was dominant among the ancient Cretans, Berbers, Moroccans, and the Egyptians after the eighteenth dynasty. It is associated with the Neolithic culture in Europe, earlier Minoan periods of Crete and the Bronze-Age in Sardinia, Portugal and parts of Arc Land, England, Utabas and western Norway. In America it is prominent where Spanish and Portuguese settled and ruled. Remnants are found in western India, among some Eskimos, and some Indian tribes on the Pacific coast

4. *The Caspian type* had a fair skin, brown wavy hair, hazel eyes, was tall and *dolichocephalic*. From the Eur-Asiatic steppes of south-eastern Russia and south-western Siberia this group wandered into Europe in the upper Palaeolithic times, east across northern Asia into America, and South into Arabia and northern Africa. In early Europe it evidently constituted the *Cro-Magnon* group and later spread over practically all of Europe and a considerable part of the world. Undoubtedly it spread over the southern end of the Caspian Sea, northern India, parts of China, Newzealand, Micronesia and northern Africa. It constituted the dominant element in the Nordic blend, produced the leaders in northern Italy, compared the Sorian invaders of northern Greece. Very early it spread over practically all of Asia and in the second century B. C. mixed with the Mediterranean group again spread over much of India, where it became the Hindu ruling caste. As *Kassites*, *Medes* and *Persians* it dominated Persia and the Tigris-Euphrates region. In early Egypt it was an important element and composed the bulk of 'Hamitic' Negroes or *Arayans*, *Abyssinians*. Today this group is dominant among the *Eskimos* and important in the Nordic blend in Scandinavia and other regions of north-western Europe and in settlers from these countries. It is a minor element in other parts of Europe, northern India, Tibet, Japan (*Ainu*), South-eastern China and Polynesia. It appears to be one of the oldest groups in the New world is still prominent in many Indian tribes.

5. *The Mongoloid group* was very short, *brachycephalic* with a yellowish skin and 'Mangoloid' eyes. It seems to be one of the older, if not the oldest of the types. It developed in inner Asia along the eastern plateau which remains its homeland, and spread west into Africa and the Balkan regions in

early Palaeolithic times, and east and south-east into Mongolia, where with the Palae-Alpine it built the Mongolian empire. It appears to have been a strong element in Belgium and parts of Switzerland in Neolithic times. It represented a minor element in the Canary Islands, but later amalgamated with the Proto-Austroloid and Proto-Negroid groups. Today it is dominant in its homeland and among the Lapps, and is moderately represented in the Central European highlands. There are indications of the presence of this group among the Bushmen in South Africa and Plains tribes of North America.

6. *The Palae-Alpine type* was short brachycephalic, with a brownish skin, straight black hair, and perhaps 'Mongoloid' eyes. This group arose adjacent to the Mongoloid in the eastern and southern portion of the Asiatic plateau largely wandered with it, and in Europe amalgamated with it. There appear to have been two sub-types of the Palae-Alpine group, one much higher than the other. The dark sub-type has practically disappeared—probably amalgamated with other dark groups except among certain tribes in the Philippines and Pygmy tribes of the Congo jungle, where it is dominant and in the Malay Peninsula and in the Andaman Islands, where it is minor element. The lighter sub-type spread east and south through parts of Asia into Indo China, and west around the northern shore of the Black Sea into Central Europe. Its stronghold has been in Asia—Korea, Japan, Mongolia, and western Turkistan. It is represented throughout the Central Highlands of Europe and also in Indonesia, but it is practically absent in Africa and in the New World, except the tribes in the United States west of the Rocky Mountains and those of the Amazon Valley.

7. *The Ural type* appears to be a very uncertain group. It seems to have been all, brachycephalic, with light features. It spread from the Ural mountains and may be a sub-type that developed there, losing much of its earlier insignia. Apparently it never spread to China, Japan or any of Southern Asia even in eastern Asia, it came relatively late and from northern source. It is nowhere important today but represents an important minority among the Highlanders of Central Europe, Finns, Prussians, Basques, some Turkish groups, the tribes of Venezuela, and to a lesser extent among the Algonkian and Sionan tribes of North America. It appears to have reached south Germany in the late Palaeolithic times, and France, Belgium and Switzerland in Neolithic times.

The Ural type seems to have blended into two main sub-types (1) The Nordic blend is very tall, dolichocephalic, with a fair skin, light wave hair, and blue or hazel eyes. This subtype

developed in the Baltic area, migrated across northern and western Europe, and became the dominant element in the countries of north-western Europe and where these people have colonized, (2) The Hebrew, the other subtype, a very mixed it seems to have split into two main groups, in general the Sephardim resembles the Mediterranean type while the Ashkenozim is like the Alpine. Palestine, which became the reservoir of the Hebrew, was probably settled in the second or third century B.C. by Mediterranean with Caspian affinities. The early Hebrews perhaps resembled the modern Berber, whose nose is straight, but amalgamated with an Alpine Hittite group which gave a small part of them the so-called 'Hewish nose'—From Palestine this sub-type wandered west and south into Asia Minor, northern Africa, Italy and Spain, and later into England and Holland, north and north-west into Anatolia, Armenia, Persia, the Caucasus, and later into Europe, especially into Russia, Poland, and Germany.

8. *The Alpine Group* was tall brachycephalic, with a fair skin and straight dark hair. It seems to be rather closely related to the Caspian, Palae-Alpine and Ural types with which it continued to amalgamate as contacts took place. From the western Asiatic Plateau it wandered west into Europe. The first migration followed the southern coast, but later migrations went through central European highlands. In Neolithic times it amalgamated with the Palae-Alpine group and expanded into France, south-west Germany, Belgium, and during the Bronze-Age reached England, composing the so-called—'Celtic' people. Later groups of these people migrating from Asia into Europe were known as *Avars, Huns, Magyars, Turks and Tartars*. During the Bronze Age it wandered west and south into Arabia, Egypt, and western India, east into Manchuria, Korea, Japan, Indonesia, and China, north and east into America where it composed the dominant element of the Indian tribes, especially the *Aztecs, Incas, and Cliff Dwellers*, and became responsible for the high state of civilization found among these tribes. In many respects this group has been and continues to be the most important racial type. 'The Alpine type', according to 'Dixon,' is at the present day unquestionably dominant throughout the latter portion of the world—that is, if we consider the New world as if it were uninfluenced by European settlement, and as if it were still occupied by the aboriginal peoples, which were found there in the fifteenth century. In Europe it is in the majority everywhere apparently except along the western and northern borders, in Asia it preponderates except in the extreme south and south-east, in the New world it characterizes the great mass of the aboriginal population, in Oceania it is largely represented in Indonesia and in western and central Polynesia. Only Australia and the greater part of Africa may be outside its range.

CHAPTER 21

RACIAL COMPOSITION OF INDIA

Introduction. The population of India is made up of many strains which entered her territories at one time or another from the older Palaeolithic to the historical periods. Situated at the southern extremity of the Asiatic land mass at the head of the Indian Ocean, flanked by high mountain ranges on her northern and upper parts of her western and eastern frontiers and with the sea separating the shores of the remainder, India geographically formed a naturally protected region into which man could move only through gaps in the mountain barriers. One of the results of her topographical conditions was that the races that had come earlier and were in occupation of the country were not destroyed, but pushed south- and east-wards and to this day they form some of the main components of the population. Similarly, the hills and the forests gave shelter to a large number of primitive tribes who were left comparatively unmolested and had thus better chances of survival, living their own life. Racial types still occurring in the Indian population, therefore, contain many extremely primitive strains and represent elements from all the main divisions of mankind not found elsewhere to the same extent.

The classification of the Indian people (from anthropometric point of view) was first attempted by Sir Herbert Risley in the Census of India, 1901. He distinguished seven different ethnic types in the population of India.

RIPLEY'S CLASSIFICATION

(1) *The Indo-Aryan type* which is found generally in the E. Punjab, Rajasthan, and Kashmir and has as its characteristic members the Rajputs, Khattris and Jats. The structure of these people is mostly tall, complexion fair; eyes dark; hair on face plentiful; head long; nose narrow and prominent but not specially long. This race covers about 75 percent of the population of India.

(2) *The Dravidian type*, inhabit the southern part of India especially Madras, Hyderabad, southern portion of M.P., and the Chhota Nagpur. Its most characteristic representatives are the *Paniyans* of Malabar and the *Santhals* of the Chhota Nagpur. They are probably the original type of the population of India and now modified to a varying extent by the admixture of the Aryans, the Scythians, and the Mongoloid elements. In typical specimens the stature is very short or below mean; the

complexion very dark (approaching black) hair plentiful, with an occasional tendency to curl; eyes dark; head long; nose very broad—sometimes depressed at the root—but not so as to make the face appear flat. They form about 20 percent of the population of India.

(3) *Mongoloid type*, is distributed like a belt along the Himalayan region, Nepal and Assam. They are represented by the *Kanets* of Lahul and Kulu; *Lepchas* of Darjeeling and Sikkim. Their chief features are broad head, dark complexion (with a yellowish tinge), scanty hair on face; short stature or below average; fine to broad nose; face characteristically flat and eyelids often oblique.

(4) The *Aryo-Dravidian (or Hindustani) type* is the intermixture in varying proportions of the Aryans and the Dravidians. They are found in U.P. in parts of Rajasthan, and in Bihar, and represented in its upper strata by the *Hindustani Brahman* and in its lower by the *Harijans*. The head form in them is generally long with a tendency to medium; the complexion varies from lightish brown to black; the nose ranges from medium to broad; (being always broader than among the Indo-Aryans) the stature is lower than in the latter group and usually below the average height.

(5) *The Mongolo-Dravidian (or Bengali) type* is found in Bengal and Orissa (comprising of Bengali Brahmans and Bengali Kayasthas). This type is a blend of the Dravidians and the Mongoloid elements, with a strain of Indo-Aryan blood in the higher groups. The head is broad and round, complexion dark; hair on the face plenty, nose usually medium with a tendency to flatness in some cases. The stature is medium and sometimes short.

(6) *The Scytho-Dravidian type* is an admixture of the Scythians and the Dravidians. They generally inhabit the hilly tracts of M.P., Saurashtra and the Coorg. The Scythian element is more prominent in higher social groups of these regions, while the Dravidian features are more prominent in the lower groups. This type has lower stature, a greater length of head, moderately fine nose, fair complexion with hair on the body quite scanty.

(7) *The Turko-Iranian*. This is now found in Afghanistan and Baluchistan.

Risley does not mention anything about the Negrito element in the Population of India. But the occurrence of Negrito element in some of the Pre-Dravidian tribes cannot be denied. Iyer observes wooly hair among the *Kadars*, and *Pulayas* of Cochin and also among the *Uralis* and *Kanikars*. The

infiltration of the Negroid element must have taken place during the 8th to 10th century A.D. Dr. A.C. Haddon has referred to an early dark Negroid race in Susiana and its drift to India is not impossible. Lapique also found some distinct Negro faces near South Indian virgin forests. Dr. J. Hutton has shown that there is a Negrito substratum in the population of the eastern frontiers of India.

SUBSEQUENT CLASSIFICATIONS

After Risley various anthropologists have tried to classify the Indian people but none could give a precise and scientific classification till the Census of 1931 when Dr. B. C. Guha revised the earlier accounts and made a classification of the Indian people.

GIUFFRIDA'S CLASSIFICATION

According to Giuffrida-Ruggeri, the following ethnic classification of India can be made:—

- (i) *Negritos*, *Veddahs* (in Ceylon) and some southern Indian jungle tribes.
- (ii) *Pre-Dravidians* or *Australoid*, *Veddaic*, *Santhals*, *Oraons*, *Mundas* and *Hos*, etc.
- (iii) *Dravidians*—*Telegu* and *Tamil* speaking people.
- (iv) *Tall Dolilchcephalic elements*—*Todas*.

HADDON'S CLASSIFICATION

According to Haddon, India is divided into three main geographical regions, viz.—the Himalayas, the northern plains and the southern mostly jungle covered plateau. In his opinion the racial history of India is not yet thoroughly known. The following racial elements are noticed in: (a) the Himalayas—

- (i) *Indo-Aryans*—*Kanets*, east of the Punjab with a trace of the Tibetan blood.

- (ii) *Mongoloid*—In Nepal and in higher mountains.

(b) The main racial element of the plain is the *Indo-Afghan*. The *Jats* and the *Rajputs* are the representatives of this type.

(c) For the main population of Deccan, Haddon uses the term '*Dravidian*'. The main racial elements as observed by him in Deccan are:—

- (i) *Negrito*—A suspected strain is taken into account. It is represented by the *Kadars*.

(ii) *Pre-Dravidians*—the Santhals and the Mundas are the best examples.

(iii) *Dravidians*—Tamil Brahmins and the people of Malabar, Cochin and Travancore are included in this group.

(iv) *Southern Brachycephals*—Parava (fisherman of the Tinnevelly Coast) and *Pariyan* (of Tamil district).

(v) *Western Brachycephals*—are represented by the Nagar Brahmins, Coorgs, etc.

'The position of Todas in anamalous'.

EICKSTEDT'S CLASSIFICATION

Freiherr von Eickstedt (who led the German Indian Anthropological expedition in this country in India during 1926-29) has classified the Indian people both from physical and cultural points of view. He has given four main divisions

(I) *Weddid* or *Ancient Indians*—Primitive people of jungles. They are divided into:—

(a) *Gondid*—Dark brown complexion, curly hair totemistic, mattock using culture, matri-archal influence—The *Oraons*, the *Gonds*, etc.

(b) *Malid*—Hair is curly with black brown colour, originally ancient culture with foreign influence—The *Kurumbas* and *Veddahs*, etc.

(II) *Melanid* or *Black Indians*—Radially mixed group. It is divided into—

(a) *South Melanid*—Black brown people in the most southern plains of India with strong foreign matriarchy—e.g., *Yanadi*.

(b) *Kolid*—primitive people with dark brown complexion of the north Deccan forest, strong totemistic and matriarchal influence—e.g., *Santhals*, the *Mundas*.

(III) *Indid* or *New Indians*—Racially advanced people of the open region. They are divided into—

(a) *Gracile Indid*—Brown people with gracile appearance, and have enforced patriarchy—e.g., *Bengalis*.

(b) *North Indid*—Light brown people, possibly original patriarchal headmanship—e.g., *Todas* and the *Rajputs*.

(IV) *Palae-Mongoloid*—*Palayan* from *Wynad*.

DR. GUHA'S CLASSIFICATION

According to Dr. B. C. Guha the following are the ethnic

composition of the present day Indian population:—

1. The Negrito.
2. The Proto-Austroloid.
3. The Mongoloid.
 - (a) Palae-Mongoloid.
 - (i) Longheaded type.
 - (ii) Broad-headed type.
 - (b) Tibeto-Mongoloid.
4. The Mediterranean.
 - (a) Tibeto-Mongoloid.
 - (b) Mediterranean.
 - (c) Oriental Type.
5. The Western Brachy—cephals or the Alpo-Dinaric.
 - (a) Alpinoid.
 - (b) Dinaric.
 - (c) Armenoid.
6. The Nordic.

1. *The Negrito.* There have been continued disputes regarding the existence of Negroid strain in Indian population. As a matter of fact one finds true Negrito people in the Andaman Islands (in the Bay of Bengal) in New Guinea, the Philippines and also in the *Semangs* and *Sakais* of the Malaya Peninsula. On the main land of India Lapique claims the existence of a Negrito strain among some of the forest tribes of Southern India. The wooly hair (which is anthropologically indicative of Negro blood) is to be found among the *Kadars* and *Pulayans* of Travancore-Cochin, and probably also among the *Irulas* and primitive tribes of the Wynaad. But Thurston denies the above statement. On the contrary Guiffrida Ruggeri thinks that among many of the south Indian jungle tribes Negritos who are supposed to have been there before the Pre-Dravidians, are still to be found. Dr. Haddon admits that a Negroid population has been suspected in the Deccan (e.g., among the *Kadars*) but it has not been definitely established. Dr. Hutton has given much attention to the Negrito problem. According to him Negrito substratum is found in the population of eastern frontier of India. He has found out distinctly frizzly hair among some of the *Angami Nagas* of Manipur and Cachar Hills.¹ The Negrito strain has also been found by Dr. Guha, among the *Kadars* and

¹ J. H. Hutton, *Man in India* (1927), p. 7.

some other hill tribes.² S. Sarkar also found spirally twisted hair among many aboriginal tribes of the Rajmahal Hills.³ Dr. Hutton generalising the facts writes, "The earliest inhabitants of Indian Peninsula were probably Negroid in type and the Negrito rapidly disappearing though he is, still survives in the Andaman Islands.....but he has left few traces on the mainland of India (and Burma). In the *Kadars* and *Uralis* of the forests of the extreme south of India occasional individuals with frizzly hair and low stature and Negro-like features are very suggestive of the survival of the Negro race." Guiffrida Ruggeri maintains the pre-existence of Negritos between India and Persian Gulf and their survivals in Susiana upto historic times.

In the Bay of Bengal, in the Malay Peninsula, in part of the Fiji Islands, in the New Guineas in Southern India and southern Arabia, the presence of Negritos or a suspected Negroid substratum induces one to suppose that at some remote pre-historic times a Negroid population occupied a very great part of the Asiatic mainland and specially the southern part of it. Subsequently, on arrival of the Pre-Dravidians and the Dravidians who proved themselves stronger, this primitive population might have been dispersed extinct, or absorbed. At the present time they are not found in any strength but only as remnants of an ancient race pushed into the hills of southwestern India where they were partially absorbed by other tribes, but in more isolated inaccessible tracts such as *Perrambiculum* they were segregated and preserved their features.

The chief characteristics of these Negritos are: The texture of the hair is fine and of wooly nature, they are of pigmy stature,—the mean being below 5 ft., small head bulbous forehead, smooth brow-ridges and feeble chins. They are dark in colour. Head form is variable—it may be round, medium or long. Their limbs are delicate with arms long in relation to the legs. The face is short and protruding and the nose flat and broad and the lips are thick and everted.

What the Negritos contributed to the Indian culture is not known, but there is some ground for thinking that the cult of the fig tree originated from them.

2. *The Proto-Austroloid*. Most probably the second immigrants were the Proto-Austroloid or the Pre-Dravidians, whose earliest ancestors could be traced to Palestine. But when and by which way they came is still unknown. However, this type is the predominant element at present in almost all the tribal population in India, especially southern, central and partly

² B. S. Gupta, *Nature* (1929), p. 123.

³ S. Sarkar, *Nature* (1936), p. 37.

northern. Their great affinities in skin colour, head form, hair, face, etc., with the Veddahs of Ceylon, Australians and the Melanesians indicate that the four belong to the same type. But whether this people migrated out of India or are immigrants into India cannot yet be definitely known. For their affinity with the Australians the term Proto-Austroloid is given. It is true that in the typical Australians the brow-ridges are extremely stout, the nasal root very sunken, and there is an abundance of bodily hair not usual in the Indian tribes, but there is a large number—especially among such tribes as the *Chenchus*, *Malayans*, *Kurumbas*, and the *Yeruvass* of South India and among many members of the *Munda*, *Kol*, *Santhals* and *Bhils* groups—where these characteristics are also marked. The 'exterior' castes of Hindu Society throughout the greater part of the country are also mainly constituted from this racial strain.

The physical features of this type are: colour dark-brown to nearly black, long head, broad and flat nose but depressed at the root, wavy and even curly hair, fleshy everted lips and short stature.

This race contributed a lot towards Indian culture. To them may perhaps be attributed a large share of totemistic rites, exorcism, food taboos and magical beliefs still obtaining in Indian life. The ban on commensality and inter-marriage which forms the basis of caste system must also owe its origin to them.

3. *The Mongoloid*. The Mongoloid people came into India from their homes in north-western China about the middle of the first millenium B.C. to Tibet, and in subsequent centuries they penetrated the plains of the north and east Bengal and the hills and the plains of Assam. Though the difficult land routes in the north and north-east have always stood in the way of large scale invasions or migrations yet slow infiltration could not have been checked and the three types of the Mongoloid people are still found in the north-eastern India in Assam, Nepal and parts of eastern Kashmir. This type differs from the other group by the following special characters: (i) Flat face with prominent cheek bones, (ii) almond-shaped eyes, and (iii) scanty hair growth on body and face.

As said above the Mongoloid group contains three types, viz.: (a) *The Palae-Mongoloid* who are of more primitive nature and do not exhibit the characters so conspicuously. It is distinguished by the form of the head, long to medium with bulging occiput, nose medium, eye-slits oblique, face short and flat with prominent cheek bones and dark to light brown skin. This variety is known as the *Long headed type*. They are predominant in the tribes—such as the *Nagas* living in the sub-Himalayan regions, Assam and Burma Frontier. It extends far

into Yunnan and south-eastern China. The *Semi Naga* is the true representative of this type. (b) The other one of this group the Broadheaded type is found in the hill tribes of Chittagong (such as the *Chakmas* and the *Mugh*s) now in Pakistan. The *Lepachas* of Kalimpong are also included in this group. Their head is broad, nose medium, darker skin, obliquity of eye-slits and eye-folds are more marked. The face is short and flat. The character of the hair is straight but tending towards short waves (wavy).

(4) *The Tibeto-Mongoloid*. They are broad-headed people with light skin, tall stature, flat and broad nose, very marked face with long and flattish character. The absence of hair on body and face are more marked. They are found in Sikkim and Bhutan.

The Mongoloid type had exerted a great influence on the culture of India. The use of milk, tea, rice, paper, terraced cultivation, communal houses, head-hunting and betel-nut culture may be mentioned as the contributions of the Mongoloid races. To one of its branches—Oceanic—we also owe the introduction of outrigger canoe, the cocoanut and the pine-apple.

The three types Negrito, Proto-Austroloid and the Mongoloid constitute the main tribal population in India. In addition to these, the general population contains mainly the Mediterranean, the Alpo-Dinaric and the Nordic races, of these the Mediterranean group is the largest. There is not one uniform type of this race but rather a number of closely graded types characterised by the common possession of moderate stature, long head, slightly built body and dark complexion. This group probably differentiated in the southern Steppe of northern Africa and the adjoining Asiatic mainland, and, following the northward movement of the storm zone at the close of the Ice-age, drifted both westwards and eastwards. Three distinct types of this race can be distinguished in India.

(a) *The Palae-Mediterranean*. Dark skin, long head with high vault and projecting occiput, narrow face but disharmonic in character, broad nose, medium stature, hair growth scanty on body and face, are the distinguishable characters of this people. This type appears to be predominant in the Telegu and Tamil Brahmins of South India.

The Palae-Mediterranean probably brought pottery, Megalithic culture, with its associated fertility rites and human sacrifices and it seems likely that they were responsible for introducing matriarchal institutions and the high position of women in peninsular India.

(b) *The Mediterranean Type*. This type is responsible for the development of Indus Civilization and subsequently dispersed by the 'Aryan' speaking Vedic invaders—who came from the Northern Mesopotamian regions about 2000 B.C. via Iran—to the Gangetic basin and to a smaller extent, beyond the Vindhya. It forms today a dominant element in the population of northern India and occupies chiefly the East Punjab, Kashmir, Rajasthan and U.P. This type is represented by Marhattas of M.B.; Brahmins of U.P. and Cochin, Bombay and Malabar.

Dark to olive brown skin, head and face long, narrow nose, medium to tall stature, slender build of the body, the growth of hair on face and body much more pronounced, better developed chin and large open eyes are the chief features of these people.

This race developed the civilization of the Indus valley, and to it we owe the largest content of the present day Indian religion and culture. Most of the common domestic animals, river transport, garments, the structure of houses, the use of brick, painted pottery and the building of towns are due to them. Astronomy and the Indian script are also their contributions.

(c) *The Oriental Race of Fischer* (or the *Semitic Type*). The chief concentration of this race has always been in Asia Minor and Arabia, from where it must have come to India. This type resembles the Mediterranean except in nose formation, which is long and convex and this type is strongest in the Punjab but throughout Rajasthan and the western U. P. it is common.

5. *The Western Brachycephals* (Broad-heads) came into India from the west. They are designated as 'Alpine' (from their associations with that of European regions); 'Dinarics' (from the Dinaric Alps which stretch from Dalmatia to Croatia) and the 'Armenoids'.

(a) *The Alpanoids*. Skin lighter than the Mediterraneans, head broad with round occiput round face with prominent narrow nose, stature medium sometimes short, hair growth abundance on body and face, the body thick-set and strongly built are the main criteria of this group. This type possibly moved from Southern Baluchistan through Sind, Saurashtra, Gujarat and Maharashtra into Kannada, Tamilnad and Ceylon and along the Ganges to Bengal. The intermediate Malabar and Andhra country remained unaffected. The people of this group are found in Saurashtra, (Kathis), Gujarat (Banias), and Bengal (Kayasthas). The major racial strains of Bengal and Bombay belong to this group.

(b) *The Dinaric*. Skin slightly darker, head not so broad but very short with flattened vertical occiput and vault very high, forehead seems to be rather receding slightly, face comparatively long, nose long and often convex, stature tall—are the main features of this sub-type. The presence of this sub-type is very marked in Bengal, Orissa and Coorg often mixed with the Mediterraneans.

(c) *The Armenoid*. This group possesses white skin, short to medium stature, broad head, narrow and aquiline nose with a depressed tip and broad wings. The *Parsees* of Bombay are the true representative of this group. The occurrence of this type among the *Bengali Vaidyas* and *Kayasthas* is not a rare one.

6. *The Nordics*. This race came last of all from the north and belonged to the Northern Steppe folk moving south-westwards in a great racial wave along the Kassites, they swept into north-west India somewhere during the second millenium B.C. This type bears the following physical features; fair skin, head long often medium with arched forehead and occiput protruding, prominent narrow nose with tall stature. In north India this type is noticed but marked by admixture with the Mediterraneans. The sprinkling of this element has reached the western side of India as well as far east in Bengal.

This type contributed a lot to the culture of India. They brought horses, probably iron and best variety of wheat. The use of milk, alcoholic drinks, dicing, chariot racing, and tailored garments were due to them. They introduced patriarchy in Indian social life, but their chief gift was the '*Aryan language*'. They have been, in fact, directly or indirectly responsible for most of the glories of Indian literature, philosophy and art.

Conclusion. From what has been stated above it will be found that the present population of India is an admixture of almost all the races of the modern world with some variations due to climate and environmental influences. Though ethnic zones can be demarcated according to the predominance of the groups, it must be clearly understood that no rigid separation is possible as there is considerable overlapping of types. The Negrito is nearly extinct. The *Proto-Australoids* are found in distant parts, almost in secluded areas in the hilly regions and jungles of southern, western and central India. The Mongoloid group were not intermixed with the whole population though scattered and stray cases may be found in the north-eastern regions. The Mediterraneans gradually settled in the Indus valley, the present desert tracts and travelled along the Ganges valley. These settlements and movements were the results of

fresh incursions, fights, defeats and conquests. This group and the Alpine groups with a sprinkling of Nordics settled and intermixed in vast northern plain. In the Ganges valley we find in the upper portion a dominance of the Mediterraneans, while in the lower valley (in Bengal), the Alpo-Dinaric is decidedly dominant. While the Mediterranean and the Alpo-Dinaric groups with some Proto-Australoid, settled down, intermixed and become dominant in the area south of the Vindhya. The Nordic or the Proto-Nordic is scarcely found in the Deccan excepting a very few in the Central India region.

CHAPTER 22

TRIBES IN INDIA

The total population of India is 356,829,485, out of which the Scheduled Tribes account for 19,111,498.¹ Article 366 (25) of the Constitution of India has defined "Scheduled Tribes" as "such tribes or tribal communities or part of or groups within such tribes or tribal communities as are deemed under article 342 to be Scheduled Tribes for the purpose of this Constitution." By the Constitution (Scheduled Tribes.) Order, 1950, issued by the President in exercise of the powers conferred by Clause (1) of the Article 342 of the Constitution of India, 212 tribes in 14 States have been declared to be Scheduled Tribes.² These tribes constitute 5.36 per cent of the total population of the country, i.e., out of every 1,000 Indian, 54 belong to the tribal community.

CLASSIFICATION

It is a somewhat difficult task to classify the tribes into different groups. However, the Indian Commissioner for scheduled castes and scheduled tribes recently investigated the possibility of adopting a classification criterion going beyond the legal concept cited above. With this aim in view the different States Governments were asked to suggest the characteristics which seemed to them most suitable for distinguishing the so-called "Aboriginal" groups from the rest of the population. The variety of elements suggested shows the difficulty inherent in such an attempt. For instance, (i) The Assam Government gave these characteristic features: (a) descent from Mongoloid stock, (b) being members of the Tibeto-Burman linguistic group and (c) the existence of a unit of social organisation of the village clan type; (ii) the Bombay Government: residence in forest areas; (iii) the M.P. Government: tribal origin, speaking a tribal language and residence in forest areas; (iv) the Madras Government a primitive tribal way of life and residence in less easily accessible hills and in remote or interior forests, with little or no contact with other population group; (v) the Orissa Government: pre-Dravidian or Mongoloid racial origin; (vi) the West Bengal Government: residence in jungle and tribal origin; (vii) the Hyderabad Government: residence in jungle, animistic religion, the use of local dialect, forcible marriage,

¹ *Census of India*, Paper No. 4 (1953), Special Groups, 1951 Census, p. 16.

² *Ibid.*, pp. 38-41 and 46-47. Of these 29 are in Assam; 24 in Bombay; 31 in M. P.; 40 in Madras; 42 in Orissa; 7 in West Bengal; 3 in M. B.; 6 in Mysore; 18 in Tripura; 14 in U. P.; 7 in Bhopal and 3 in Manipur.

hunting, fishing and gathering of forest products as the main means of subsistence, etc; (vii) the Mysore Government: habitation in remote hilly tracts in the jungle, (ix) the Travancore Government: habitation in the jungle, tribal religion and certain racial or cultural characteristics, (x) the Bhopal Government: habitation in remote jungle and hill districts, nomadism, hunting and gathering of forest fruits as the main means of subsistence; (xi) the Vindhya Pradesh Government: dark skin, flat nose, preference for fruits, roots and animal flesh, rather good grains, the use of bark and leaves of trees as clothes on ceremonial occasions, nomadism, witch-doctoring and the worship of ghosts and spirits.³

From the above description it will be evident that different Governments have given different characteristics for the people to be labelled as tribals, although certain features are common to them all. We may classify them on the basis of their (i) Territorial distribution; (ii) Linguistic affiliation; (iii) Occupation or economy; (iv) Physical characteristics; and (v) Culture-contact.

1. TERRITORIAL DISTRIBUTION

According to the first classification, they may be divided into four important groups: (a) the tribes living in the northern and north-eastern zone; (b) tribes inhabiting the central zone, (c) tribes scattered over the extreme corners of south-western India in the hills and the converging lines of the Ghats; and (d) small groups in several parts of the country or even within the political boundary of the country.

(a) The northern and north-eastern zone consists of the sub-Himalayan region and the mountain valleys on the Eastern Frontiers of India which merge imperceptibly with those of Burma in the South-east. The easternmost tribal concentration is found in Assam, Manipur and Tripura, where they number 2.1 million.

The most important tribes living between Assam and Tibet may be mentioned the Aka, the Dafla, the Miri, the Gurung, and the Aptanic on the West of the Subansiri river, and the Gallong, the Minyong, the Pasi, the Padam and the Pangli in the Dehong valley. The Mishmi tribes live in the high ranges between the Dehong and Lohit rivers, the Chulikata and Belejiyas on the western and the Digaree and the Meju on the eastern parts. Farther east are found the Khamtis and the Singhpos and beyond them, converging on the south, are the different

³ L. M. Shrikant, *Report of the Commissioner for Scheduled Castes and Scheduled Tribes for the period ending 31st December, 1951*, pp. 109-11 (1952).

Naga tribes occupying the mountain valleys on both sides of Patkois.

The Naga tribes consist of five major groups: the Rangpan and the Konyak in the northern; the Rengma and the Sema, and the Angami in the western; the Ao Lahota, the Phom, the Chang, the Santam and the Yimstsunger in the central; the Kacha and the Kabui in the southern and the Tanga-khul Kalyo-Kengu in the eastern section. South of the Naga hills running through the States of Manipur, Tipperah, the Chittagong Hill Tracts, live the Kukis, the Lushais, Lakhers, the Chins, the Khasis and the Garos—many of whom are really overflows of the tribes from across the Frontiers or are closely related to them. In the Sub-Himalayan region in Sikkim and the northern portions of Darjeeling there are a number of rather primitive tribes of whom the Lepchas are the best known. In the U. P. also a number of tribes such as the Tharus, Bhoksa, Khasa, Korwa, Bijar, Bhuia, Majhi, Cheri, Raji, and Kharwar are found.

(b) The central zone, which is separated from the north-eastern zone by the gap between the Garo hills and Rajmahal hills, consists of plateaus and mountainous belt between the Indo-Gangetic plain to the north and roughly the Krishna river to the South. In this zone we have another massing of tribal peoples in M. P. with extensions in U.P., M.B., and Hyderabad.

The important tribes inhabiting this zone beginning from the Eastern Ghats and Orissa hills are the Savara, the Gadaba, and the Borido of the Ganjam district; the Juang Kharia, the Khond, the Bhumji and the Bhuiya of the Orissa hills. In the plateau of the Chhota Nagpur live the Mundas, the Santhals the Oraons, the Hos and the Birhors. Further west along the Vindhya ranges live the Katkaris, Kols, and the Bhils, the latter extending as far to the north-west as the Aravalli hills. The Gonds form the largest group and occupy what is known as the Gondwanaland and extend southwards into Hyderabad and the adjoining States of Kankar and Bastar.

On both sides of Satpuras and around the Maikal hills are found similar tribes like the Korku, the Agaria, the Pardhan and the Baigas. In the hills of Bastar state live some of the most picturesque of these tribes, viz., the Murias, and the Hill Murias of the Abhujhamar hills and the Bison-horn Marias of the Indravati Valley. Majority of these people show similarity of race and culture.

(c) The third zone consists of that part of the Southern India which falls south of the river Krishna (below latitude 16°N) stretching from Wynaad to Cape Comorin. From the

fact that they occupy these marginal areas and also from the records in the oldest Tamil literature of the Sangam period they appear to be one of the most ancient and primitive inhabitants now living in India having been pushed by the intrusion of more advanced people into their present habitats, where safety and shelter were found against increasing pressure.

Beginning from the north-east the Chenchus occupy the arc of the Nallaimallais hills across the Krishna and into the Hyderabad State. Along the Western Ghats from the Koraga of South Kanara, the Yeruvas and the Todas living in the lower slopes of Coorg hills; the Irulas, Paniyans and Kurumbas of Wynaad, and stretching almost to Cape Comorin along the ranges of Cochin and Travancore and sheltered in the isolation of the forest are found the most primitive of Indian aboriginals such as the Kadar, the Kanikkar, the Malvadan, the Malakuran, with many of their original traits still preserved.

(d) In addition to these three major zones there is a fourth small and isolated zone consisting of the Andamans and the Nicobar Islands. The main tribes living in this zone are the Jarawa, the Onge, the North Sentinelese, the Andamanese and the Nicobarese; though separated from the main body of India's aboriginal tribes, they are ethnologically connected with them.

2. LINGUISTIC AFFILIATION

Linguistically these tribes may be divided into a number of groups based on their affiliation to the various families of languages:

(a) The Austro-Asiatic linguistic branch under which come the Kol or Munda speeches of the Central and Eastern India and Khasi of Assam. The languages spoken in different areas are: Nicobarese in the Nicobar Islands; Santali (2,811,578 speakers), found in Bihar, Orissa, West Bengal and Assam; Mundari (536,338); Ho (599,876); Kharia (180,000); Bhumij (101,508); Garo (239,816); Khasi (230,982) and a few others which belong to Bihar and Assam. The language of Korku (170,607) is spoken in M.P. and Berar; while Savara (Saora) (256,259) and Gadaba are spoken in Orissa. Outside the Kol group, there is the language of Nicobarese (only 10,000) in the Nicobar Island.⁴

(b) The Dravidian Linguistic Group is popular in Central and Southern India. It is spoken by Gonds—Gondi (1,232,886) in M.P., Hyderabad and Andhra State; Khondh or Khond (280,561) in Orissa; Kui (206,509); Kurukhor Oraon (644,042) in Bihar and Orissa; Malto (71,000) in Rajmahal Hills in Bihar; the other tribes under this group are: Maler, Polia, Saora, Koya,

⁴ *Census of India, Paper No. 1 (1954), Languages, 1951 Census, p. 8.*

Paniyan, Chenchu, Irulas, Kadar, Malser and Malakurwan.⁵

(c) The Tibeto-Chinese family includes the tribal languages of various people belonging to the Mongoloid element; and they are found along the southern slopes of the Himalayas, from the northern Punjab to Bhutan and also in northern and eastern Bengal and in Assam, e.g., the Nagas, the Kukis, the Abhors, the Daflas, the Miris, the Khasis, and the Mikirs.

3. OCCUPATIONAL CLASSIFICATION

The tribes of India not only speak different languages, but also have distinctive economy of their own. They live in different economic stages ranging from food-gathering and hunting through shifting cultivation to settled plough cultivation, e.g., the Birhor, Korua and Hill Maraia depend on food-gathering and hunting for their livelihood. The Baiga, Pauri (hill) Bhuiyan, Jhuang and Kutia Kandh tribals are shifting cultivators. The Munda, the Santal and the Oraon depend primarily on permanent plough cultivation for their living. The Naga tribes have developed a system of terraced cultivation with elaborate means of irrigation by aqueducts.

Dr. Hutton classified these tribes into three groups: (i) Primitive tribes collecting forest produce, (ii) Primitive tribes, pastoral, and (iii) Tribes practising agriculture, hunting, fishing and industries.

The following table shows the economic status of the tribes:⁶

<i>Where found</i>	<i>Hunting and collecting stage</i>	<i>Shifting or Jhum cultivation, lumbering manufacturing catechu</i>	<i>Settled agriculturists who keep poultry, cattle, know weaving spinning, pottery and terraced-forming</i>
U. P.	.. Raji	.. Karwa, Saberia, Bhuia, Kahrwar.	Tharu, Majhi, Bind, Bhoksa, Khasa, Kol.
Bihar	.. Kharia, Birhors	Korwa, Asur	.. Munda, Ho. Tamararia, Oraon.
Assam	.. Kuki, Konyak, Nagas.	Naga tribes, Garos, Lakhers.	Khasi, Manipuri.
West Bengal	.. Kuki]]]]	.. Garos, Malpaharia..	Polia, Santhals.

⁶ D. N. Majumdar, *Races and Cultures of India*, p. 92.

Madhya Pradesh	Hill Maria	..	Muria, Dandami, Parja, Bhatra Maria, Gond
Madras and Hyderabad	Koya, Paliyan, Conta-Reddi. Hill Pantaram	Khonds, Kurumba, Gonds, Saora, Mudavan	Badaga, Kota, Irulas, Parja
Orissa	.. Juang	.. Saora ..	.. ..
Bombay and Rajasthan	Bhils	.. Bhils ..	.. Bhils and Gonds.

4. PHYSICAL CHARACTERISTICS

(a) Physically the tribes of the North-East frontier are Mongoloid with light skin colour, straight and dark hair, flat nose and prominent cheek bones. Majority of them are of medium stature with long heads, scanty hair growth on body and face, and almond-shaped eyes. All these tribal people, including the women, are muscular with great development of calf-muscles. They are great mountaineers and carry a considerable amount of loads to high altitudes. They are healthy, hard-working and of independent spirit and their life is well-balanced with democratic councils and considerable stress on personal liberty of thought and action. They have childlike simplicity. They are very honest but not trained for sustained labour and concentration of mind.

This type is represented by the Nagas, Semi-Nagas, Chakmas, Mughs, and Lepchas.

(b) In the central zone the Negrito strain is not marked. The tribes very largely conform to the pattern of what are called the "Australoid characters." Physically they are of short to medium stature, dark-skinned with long head, and generally possessing curly but not frizzly hair, broad and flat nose but depressed at the root, fleshy everted lips. They are strong, muscular and well-built.⁷

This type is represented by the tribes like the Chenchus, Kurumbas, Yeruvas, Malayans, Mundas, Kols, Santals and Bhils.

(c) In the Southern zone there is an undoubted Negrito strain, although at present greatly submerged, still surviving in some of the more primitive and isolated of these tribes such as the Kadars of Perambiculam and hills of Cochin, and the Irulas and Panyans of the Wynaad. Physically they are of short to medium stature, of deep chocolate brown skin colour, small head, bulbous forehead, smooth brow-ridges and feeble chin. The face is short and protruding and the nose flat and broad and

⁷ V. Elwin, *The Aborigines* (O.U.P. Pamphlet on Indian Affairs, No. 14), pp. 8-12.

the lips are thick and everted, the head shape is long, hairs fine and of wooly nature, and the body well-developed.

At the present time they are greatly intermixed and it is only in the extreme interior that more archaic types are to be found.

5. CLASSIFICATION ACCORDING TO CULTURE-CONTACT

There are four main cultural divisions among the aboriginals. The first two classes consist of the comparatively small block of real primitives living in the hills. Their religion is characteristic and alive; their tribal organisation is unimpaired; their artistic and choreographic traditions are unbroken; their mythology still vitalizes the healthy organism of tribal life. Geographical conditions have largely protected them from the debasing contact of the plains.

The wilder aboriginals have to be sub-divided into four sections: (a) The first class, in the most primitive and simple stage of all, comprises Hill Marias of Bastar State, the Juangs of Keonjhar and Pal-Labara, the Gadabas and Bondos of Orissa, the Baigas of Pandaria and Kawaedha, etc. This group has the following characteristics: (i) Its members live a largely communal life like that of the Hill Marias, the Hill Baigas and the Juangs. (ii) Economically they share one another's property. (iii) Their life still centres round a peculiar form of agriculture (Jhum). (iv) They are shy of strangers, but among themselves honest, simple and innocent. Crime is rare and women are virtuous.

(b) The second class lives in regions equally remote. They are equally attached to their solitude and to their ancient traditions, but they have begun to change in many ways. The important tribes of their class are Bison-horn Marias or the Bhomia, and Binjhar and Baigas. Their chief characteristics are: (i) Their village life has become individualistic. (ii) They no longer share things with one another. (iii) Axe-cultivation is more a habit rather than a part of their life. (iv) They are more accustomed to outside life and are generally less simple and honest than the above class.

(c) The third class of aboriginals is the most numerous. It consists of all those who under the influence of external contact have begun to lose their hold on tribal culture, religion and social organisation.

(d) The fourth class, which consists of the old aristocracy of the country represented today by the great Bhil and Naga chieftains, the Gond Rajas, a few Binjhar and Bhuiya landlords, Korku noblemen, wealthy Santal and Oraon leaders and

some highly cultured Mundas. These retain the old tribal names and their clan and totem rules and observe elements of tribal religion though they generally adopt the full Hindu faith and live in modern style.

The process through which the tribal cultures are usually transformed or modified may be:

(i) *Simple adoption*, which means the acquisition of technical skill, adoption of tools, implements, ideas, customs and rites by one social group from another, e.g., the Warli of Thana district is yet simple and unostentatious, puts on a loin cloth without anything on his head, but his colleague in the south being in constant contact with the Kolis puts on a shirt, dhoti and turban after the latter's fashion. Similar taking over of the elements of material culture from neighbouring groups is found in all tribes today—especially the Bhils, the Gonds, the Santals, etc.

(ii) *Acculturation*, which is the process of change due to contacts with other people. It involves acceptance and adoption. A tribe in contact with civilization may accept some of the traits of their neighbours, e.g., the employment of Hindu priests in indigenous ceremonies and festivals among some of the tribes in Bihar is an example of simple acceptance. Similarly, Munda tribes have accepted some of the cultural traits from their neighbours, while Rajbansis have shown an adaptation to Hindu culture. The Lambadis of the Deccan have taken to agriculture, they have adopted the dress of their neighbours and the tribe is divided into sections based on occupations. Similar adaptation is found among certain sections of the Gonds, the Raj Gonds and the Navgharia Gonds and the Bhils.

(iii) *Assimilation*, i.e., by a gradual drift to Hinduism. When certain members of a primitive tribe move down into the plains they tend to become assimilated, in contrast to other members who remain behind. The evidence of assimilation in many cases is apparent. Certain Santhals of Bengal give distinctly Hindu names to their children, practise child-marriage before the age of 7, revere the Tulsi plant, abstain from beef, "cleanse" their living quarters with cow-dung, decline food cooked by Muslims, cremate their dead; the married women put the vermilion mark on their forehead and the iron bangle in their hands.⁸

EFFECTS OF CULTURE CONTACTS

The effects of such contacts have been very far-reaching on the life of the aboriginals. Contacts with civilisation have

⁸ *Census of India*, Vol. V (Bengal and Sikkim), Pt. I, 1931, p. 383.

undermined social solidarity, invaded tribal security, introduced discomfort, disease and vice. The results may be detailed as below:

(i) The rapid opening up of the communications has resulted more in conflict than in useful contact, not necessarily a conflict of arms but of culture and material interest. Says Dr. Hutton, "Attempts to develop minerals, forests or land for intensive cultivation can only be made at the expense of the tribes whose isolation is thus invaded; tribal customs which regulate the ownership, usufruct or transfer of land are normally superseded by a code in the application of which the tribe is deprived of its property, generally in the name of law, either by alienation to foreigners or by transferring the trusteeship of a tribal chief into absolute ownership of a kind foreign to the customs of a tribe. The complicated system of administration of justice has tended to impair the natural truthfulness and honesty of the people and the social solidarity of the tribes and has weakened the authority of the social heads and the respect they formerly commanded." In spite of the best intentions, a lot of injustice is done to the aboriginals by the judges and magistrates and the police officers of all grades owing to their ignorance of customs and mentality of the aboriginal tribes they have to deal with.

(ii) The introduction of the outstill system in tribal areas, in mines and industrial centres, where they frequent for employment, has led to an increase in drunkenness and immorality. "The temptation of distilled liquor," wrote Shri S. C. Roy, "introduced by the Government, in some aboriginal areas is another evil that is working havoc—economically, morally and physically."

(iii) One of the most important effects of contacts has been the spread of diseases in tribal areas. Mills has shown, while writing about the effects on some primitive tribes of Assam of contact with civilization, that "Improved communications while they have immensely facilitated internal trade, have undoubtedly spread diseases; not only have specific diseases such as V.D. and T.B. been introduced, but epidemics have spread more quickly. The opening of the road to Manipur has led to an increase in prostitution." Emigration of labour from tribal areas to plantations and factories, where conditions are not favourable to settlements, has been the main source for the spread of epidemic diseases. The lure of free life unhampered by social control pulls women to plantations and factories where they are tempted to a corrupt life and the large incidence of venereal disease among the labourers is directly traceable to such indiscriminate mixing of the sexes. Missionaries and the

the philanthropic agencies have caused T.B., and other contagious and infectious diseases to spread in tribal areas through indiscretion, namely, by doling out second-hand clothes and apparels collected from the dead or the deceased, which are a foci of infection.

(iv) The village has ceased to be a living community; it is now an aggregate of isolated units. Old myths are being forgotten, the old gods neglected. Many of the traditional dances which used to provide recreation to the youths of both sexes, translating their joys and sorrows into the rhythm, are being abandoned. Village politics, rivalry and social disputes are replacing their old-time recreation. The effects of this transfer of interests have already been evident in the high incidence of imported diseases, poor physique, inferiority complex and a bitter antagonism to advanced groups in the neighbourhood.

(v) A large number of tribes have been living on hunting and collection of jungle products supplemented by Jhum cultivation. The effects of Jhum cultivation have led to strict rules regarding denudation of forests and today many of the tribes (who lived by shifting cultivation) have come down to the plains though most of them have not succeeded in adapting themselves to other kinds of agriculture. This is mostly due to tribal inertia, shyness of the aboriginals, their apathy for administration and, as Dr. Hutton says, "may be due to ignorance of appropriate magico-religious ceremonials necessary for other types of farming."

(vi) Many tribes have failed to maintain their tribal structures and have either been assimilated to more vital stocks or have withdrawn themselves from contacts as a defensive measure. The Andamanese, Korwas, Todas and Chenchus have fallen on evil days and are preparing themselves for exit. Some other tribes have left their tribal moorings, and have settled in the neighbourhood of higher cultural groups whom they serve. Today they have developed some sort of interdependence. The Gond tribe of M.P. may be taken as an example.

(vii) The nomadic tribes who secured their livelihood by catering to the periodical requirements of settled communities like the Marwari or the Lakhota supplying agricultural implements to the latter or repairing their indigenous tools and utensils, the Nats supplying crude nostrums for the restoration of the lost manhood, the Kanjars providing amusements, acrobatics and dances for the village communities, find it difficult to continue their customary life and have enlisted themselves into the ranks of criminal tribes whose attention to the rural communities is a perpetual concern of the administration.

(viii) Lastly, the itinerant seller of goods and trinkets, the moneylender, the licensee of excise shops, collectors of lac, honey and other forest produce are mostly aliens in culture and language. They have settled in tribal areas and have taken advantage of the gradual drift of tribal society from a moneyless economy to one in which exchange depends on the circulation of money. The implications of money economy are better understood by them and thus they have succeeded in solidly entrenching themselves in tribal areas and today they are a source of great discomfort to the tribal people. In many areas the lands have passed from the aborigines to the money-lenders and *sahukars* who make the tribals work for them.

Population of Tribes by States, according to 1951 Census.

State	Scheduled Tribes— 1951 estimates
INDIA	2,25,11,854
<i>States</i>	
Andhra Pradesh	11,49,919
Assam	17,61,434
Bihar	38,80,097
Bombay	37,43,408
Kerala	1,34,757
Madhya Pradesh	48,44,128
Madras	1,36,376
Mysore	80,402
Orissa	30,09,580
Punjab	2,661
Rajasthan	17,74,278
West Bengal	15,66,868
<i>Territories</i>	
Himachal Pradesh	27,928
Laccadine, Minicoy and Amindivi Islands	13,486
Manipur	1,94,239
Tripura	1,92,293

OCCUPATIONS OF TRIBES

What part the tribal people play in the economy of a country is hard to estimate, because the grading of the tribes on the basis of their economic life and occupations and in accordance

with any approved schemes of classification is indeed difficult as most of the tribes possess either marginal culture or follow more than one occupation. The tribal stage does not provide for any specialisation of functions and, as such, a variety of occupations are followed by a tribe. A tribe uses all kinds of occupations to eke out its subsistence and combines hunting with honey gathering, lumbering with chase, shifting cultivation with domestication of animals.⁹

Both Forde and Herskovits agree as to a five-fold division of economies among the tribes: (i) collectional, (ii) hunting, (iii) fishing, (iv) cultivation, and (v) stock-raising, and a people need not abandon one economy to adopt another.

Nieboer divides economic life into (i) gleaners, (ii) hunters, (iii) fishers, (iv) agricultural nomads or hunter-agriculturists, (v) settled agriculturists of a lower grade who also hunt or tend cattle, (vi) superior farmers who have implements, and (vii) nomad shepherds.

THE I. L. O.

The I. L. O. Committee on Living and Working Conditions of Aboriginal populations in Independent Countries classifies the indigenous populations according to their occupations in five groups thus:¹⁰

(i) Nomadic or semi-nomadic forest dwelling tribes which live by hunting; fishing and food-gathering and sometimes also by primitive forms of agriculture on land cleared by burning.

(ii) Semi-nomadic tribes living in geographically and economically marginal areas, engaged in subsistence agriculture or grazing or both and in gathering vegetable raw materials for handicrafts.

(iii) Settled independent farmers or stock raisers, working on an individual or collective basis.

(iv) Tenant labourers, bound to the estates by a traditional semi-feudal system entailing a number of personal obligations to the landowners.

(v) Wage-earners who constitute the main source of recruitment for plantations, cattle ranches, mining, forestry, etc.

MAIN OCCUPATIONS OF THE TRIBALS

Broadly speaking, the tribes in north-eastern India are set-

⁹ P. G. Menon, *Census of India, 1931, Vol. I, Pt. III-B.*, p. 216.

¹⁰ I.L.O., *Living and Working Conditions of Aboriginal populations in Independent Countries.*

tled agriculturists living on terraced fields, while shifting cultivation in the prevalent form of food production in the central zone. In the southern zone, economic life is based mainly on the collection of forest produce. Shifting cultivation is, however, a common feature in all zones. Hunting, fishing and minor cottage industries such as basket making etc., are the most important subsidiary occupation.

In the most hilly tracts the agricultural produce consists generally of coarse grains; in other areas rice, wheat and jowar are produced. Cultivation by means of cutting down a patch of forest and then planting seeds in the burnt earth and ashes with the help of a digging stick is perhaps capable of supporting about 20 to 30 people per sq. mile. Predatory form of axe-cultivation is quite popular among many of the Mongolian tribes living near the north-eastern border of India. In central belt also a few tribes like the Bhuiya, the Juang or the Savara practise this type of cultivation. As the methods of agriculture followed by the tribal people are primitive and crude, there is generally no production surplus. An important subsidiary occupation for the aborigines is employment by the forest departments and their contractors.

The following table shows occupational distribution of Scheduled tribes according to 1951 Census:¹¹

Occupation	Males	Females	Total	Percent
Agricultural :				
Owners	62,76,023	62,66,991	1,25,43,014	
Tenants	9,57,046	9,16,775	18,73,821	
Labourers	14,02,883	14,00,288	28,03,171	
Absentee landlords ..	29,686	34,568	64,245	
Total ..	86,65,638	86,18,622	1,72,84,260	90
Non Agricultural :				
Production other than cultivation.	4,11,288	3,53,696	7,64,984	
Commerce	59,467	64,174	1,23,641	
Transport	33,966	28,588	62,554	
Other services and miscellaneous.	4,42,474	4,28,769	8,71,243	
Total ..	9,47,195	8,75,227	18,22,422	10
Total Population of Scheduled Tribes.	96,17,905	94,98,593	1,91,16,498	5

¹¹ *Census of India*, Paper No. 4 (1953)—Special Groups—1951 Census, pp. 16-21.

From this table it will be seen that 90 per cent of the total population of the tribal people are dependent on agriculture, as against 70 percent among the general population. The following table gives the number of tribal people per 1000 people engaged in different occupations, as also among the general population¹²:

(Number per 1,000 persons)

				General Popula- tion	Tribal People
Agricultural Classes .. .. .	..	..	..	1,000	70
Non-Agricultural Classes .. .. .	..	..	..	1,000	17
Cultivators of Land .. .. .	..	..	..	1,000	75
Tenants .. .. .	..	..	..	1,000	59
Cultivating Labourers .. .. .	..	..	..	1,000	63
Absentee Landlords .. .. .	..	..	..	1,000	12
Production other than cultivation .. .. .	..	..	..	1,000	20
Commerce .. .. .	..	..	..	1,000	6
Transport .. .. .	..	..	..	1,000	11
Other services and miscellaneous .. .. .	..	..	..	1,000	20

Wherever the virgin forest abounds *Jhum* or shifting cultivation has been in vogue and it is known by different names in different parts of the country. In northern India it is called *Daya*, in southern India it is known as *Poduar*, *Bodaga* in the Ganjam Agency Tracts, *Deppa* in Bastar State, *Jhum* in Assam, *Khil* in the Himalayas, *Kumari* in Western Ghats, and *Walra* in S. E. Rajasthan.¹³ The usual method is to fell trees, burn them and to sow in the ashes either broadcast or by digging holes on the ground and putting all sorts of seeds together. All these wasteful ways of subsistence are being followed on a much larger scale in the Sirohi, Udaipur and Dungarpur districts of Rajasthan as the forest tribes of Bhils, Meenas, Gerasias find it more and more difficult to live by robbery and being pent up within their own wilds are compelled to draw their food from the soil.¹⁴ While agriculture is thus clearly the main occupa-

¹² *Ibid.*, p. 3.

¹³ *Imperial Gazetteer*, Vol. III, p. 25.

¹⁴ *Rajputana Gazetteer*, Vol. I, p. 23.

tion, the more advanced tribes are giving evidence of a growing diversification in tribal economy depending in each case, on the raw materials available and the man-power demand in the region.

The Gonds of M. P. are gradually abandoning agriculture and taking up employment in charcoal burning, forestry, the transport of firewood, gathering of forest fruits and the manufacture of bamboo articles. The Oragon are coming down into the plains to engage in primitive agriculture. The Bhils of Bombay and Udaipur Division prefer settled agriculture, which they have practised for last 150 years, even when they have to work the land as wage earners. In Hyderabad the same tribe, though it lives by gathering forest produce, fishing and hunting, prefers some settled occupations. When the Bhils can obtain land they show great aptitude for agriculture. Lacking land and draught animals they work as seasonal or day labourers.¹⁵

The Santhals are almost all agriculturists. In the same group falls the Majhwar, Kharwar and the Korkas of the U. P. The first two have abandoned their wild habits and have learned the rudiments of crude agriculture from their neighbours.¹⁶

Among the Kolams in M. P., the practice of *Podu* cultivation is disappearing. Only those near the hills practise it. With increased facilities of improved methods of agriculture, the Kolams are giving up readily the method of *Podu*.¹⁷

In Assam, agriculture is the general practice among the eastern tribes. The cultivation of fruits, coffee and tea has been introduced and taken up with avidity.¹⁸

The main occupation of the Tharus and Bhoksa in Bengal, U. P., West Bihar and Orissa is agriculture, supplemented by occasional hunting and fishing. The Bhotiyas furnish a transition between primarily agricultural and primarily pastoral people.¹⁹ The Todas are purely a pastoral race remaining in India.

HUNTING, FISHING AND GATHERING

About half a century ago only a little less than 50 percent of the hill tribes of the southern India depended to a great extent on food gathering—the collection of food gathering for sale or barter in the plains. At present such hill tribes as still subsist on food gathering without any agricultural production of

15 For further details, see various articles in *Tribes of India*, Vol. I and II, Published by Adimjati Sevak Sangh, Delhi.

16 D. N. Majumdar, *Fortunes of Primitive Tribes*.

17 P. S. Rao, *Among the Gonds of Adilabad* 1949, p. 64.

18 *Census of India*, 1931, Vol. I, Pt. III, p. 149.

19 S. D. Pant, *Social Economy of the Himalayas*, p. 43-44.

their own are not numerically strong. Dependent hunters who do not practise agriculture but live on the outskirts of villages and come into the markets to sell jungle produce include the Yanadi, Chenchu, Korumba, the smaller tribes of Western Madras, Hyderabad and Travancore-Cochin, and the Katodi of Baroda. However, in all the large tribes there are sections which live almost entirely on jungle produce before the autumn crop is harvested.²⁰

In Travancore the Pantaram are a nomadic hunting tribe but there is an understanding among the various groups that they shall not roam over each other's domain in quest of food.²¹

The Bagata of Madras are principally cultivators but about 25 percent of them live by coolie work and the collection and sale of minor forest produce such as honey, soapnut, myrobolan, tamarind, adda leaves, etc.²²

The Bhils of Bombay, Rajasthan and M. B. live not only by primitive agriculture, but also depend on hunting and pastoral pursuits. The other means of earning bread are wood and fodder cutting, and selling, charcoal burning, gathering of wild fruits, honey, gum, wax and joining the military service.²³

HANDICRAFTS

A number of primitive tribes in various regions engage in basket making, spinning and weaving. In Assam, the most widely practised craft is the manufacture of cloth from cotton dyed with indigenous vegetable. The people—Momba and Sherdukpen—north of the Brahmaputra make fine bowls, cleanly varnished and ornamented with delicate silver work.

In M.P. the Maria Gonds are mainly occupied in distilling spirits from the products of the forests. The Sawara, the Konds and the Gonds also take to cow-herding, metal working, weaving, cane work and pottery. The Korwas in some regions smelt iron and forge their own weapons and implements. The Agharias of M. P. are traditional smelters of iron forging a variety of tools and implements of daily use.

The Ghasis make gut from the fibrous tissue of animals. The Tharus in addition to farming make furniture and household utensils, baskets, musical instruments, weapons, ropes and mats. Baskets and mats are manufactured by the women from bamboo and reed for sale in the weekly markets and fairs.²⁴

20 W. H. Gilbert, *Peoples of India*, p. 75.

21 *Census of India*, 1931, Vol. I, Pt. III-B, p. 229.

22 A. Aiyappan, *Report on the Socio-Economic Conditions of the Aboriginal Tribes of Province of Madras*, p. 72.

23 *Indian Geographical Journal*, Vol. XXX, No. 2 (1946), p. 73.

24 D. N. Majumdar, *The Fortunes of the Primitive Tribes*, pp. 83-84.

The Irulas of Madras, also make bamboo mats and baskets, as well as ploughshares and wheels.²⁵

The Bhotiyas have developed a special aptitude for spinning and weaving wool into beautiful and durable fabrics. The women have a sound knowledge of the treatment, grading and dyeing of wool.²⁶

MINING

Some of the aboriginal tribes, living in the neighbourhood of the main collieries specially in Bihar, Orissa and West Bengal work in the coal mines. In M. P. also the bulk of the coal mining labour belong to such tribes as Gonds, Mawasipud and Mahar.. Some of the aboriginal groups show special aptitude and skill in particular operations. The Santhals are good pick miners and coal-cutters. Almost all the unskilled labour force in the mines and (about 17,000) is aboriginal. In the manganese ore mines too about 50 per cent of the labour employed is still aboriginal.²⁷ In the iron-ore industry also the labour force employed by the contractors consists of largely Santhals and Kols. In Bihar mica industry some 2,50,000 aboriginals find employment. Before the war 70 percent of the workers in these mines were Santhals; this proportion has now dropped down to 25 percent mainly on account of migration to tea plantations of Assam.²⁸

PLANTATIONS

Over half a million adult workers and the same number of children are employed in the plantation estates of Assam. About 50 per cent of this number is aboriginal—the Gonds, Konds and Santhals, and much of it comes from other States of southern and central India, by recruitment under the Tea Districts Emigrant Labour Act (XXII, of 1932).²⁹ During 1949-50 over 25,000 persons were recruited outside Assam—over 10,000 from Bihar, 9,670 from Orissa and over 4,500 from M.P.³⁰

FORESTRY

Aboriginals are also employed in collecting forest produce as well as in other works in the forests either for the govern-

25 Aiyappan, *Op. Cit.*, p. 104.

26 S. D. Pant, *Op. Cit.*, pp. 61-64.

27 S. R. D. Espane, *Report on an Enquiry into Conditions of Labour in Coal Mining in India*, 1946, p. 21.

28 Rege, *Labour Investigation Committee's Main Report*, 1946, p. 75.

29 C. M. Rajgarhia, *Mining, Processing and uses of Indian Mica*, 1951.

30 Rege, *Methods of recruitment and measures taken to protect the forest workers and better their conditions*, as Rege, *Op. Cit.*

ment department directly or for contractors. The contractors obtain from the Government the right to collect forest produce—fruits, bark, myrobolans, leaves for bidi-making, lac, gum, resin, wax and fodder of a demarcated area of the forest or to cut timber for themselves or as agents of the Government. They may also be engaged in the manufacture of wood, charcoal and catechu as in the south-eastern Rajasthan in the districts of Dungarpur, Banswara and Udaipur.

SERF-LABOUR³¹

Aboriginals are forced to perform compulsory labour³² for local authorities, landlords or contractors, as would be clear from the Report of the Commissioner for Scheduled Castes and Scheduled Tribes. "In spite of the vigorous efforts of the Government forced labour is still in existence and it is mostly the Scheduled Castes and also the Scheduled Tribes who are suffering on account of this unlawful practice."³³ According to the same authority in spite of the constitutional prohibition of forced labour in general, the State is empowered to impose compulsory service for public purposes.

The tenants are compelled to do some type of agricultural labour in landlords' fields for a number of days either without wages or for some very meagre wages. Sometimes his family members are also made to work for the landlord. Landlords sometimes advance loans to their tenants, grant them house-sites and thus bind them to render service forever.³⁴ This system

31 For interesting account of Serf Labour in India, see, S. C. Dubey, *The Kamar*, 1951; C. B. Mamoria, 'Agricultural Proletariat in India', *Modern Review*, Oct./Nov., 1952; Dinkar Dessai, 'Agrarian Serfdom in India', in *Indian Sociologists*, 1942; D. N. Majumdar, Experiment in Tribal life in India, *Journal of Social Work*, 1950; K. G. Sivaswamy, 'Serf Labour Among the Aborigines', in the *Indian Journal for Social Work*; and his 'Forced Labour in Agriculture', in *Asian Labour Quarterly*, 1949; A. M. Lorenzo, *Agricultural Labour Conditions in Northern India*, 1950; S. D. Patel, *Agricultural Labour in Modern India and Pakistan*, 1952; and *Agrarian Reforms Committee Report*, 1952.

32 *The Indian Labour Year Book*, 1950, defines forced labour as "work or service, whether with or without payment which is expected from a person against his will either by the government for public purposes under legal provisions or by landlords or creditors, or by other private individuals."

In the first category are included certain commercial services rendered by aborigines for sanitation or the upkeep of public property. The second category includes work or service exacted by zamindars, malguzars and other non-cultivating landowners or proprietors from their tenants. Vide, p. 268.

33 L. M. Shrikant, *Report of the Commissioner for Scheduled Castes and Scheduled Tribes*, 1951, p. 26.

34 This practice exists in many parts of rural India and is known under different names such as the Harwahi system in U.P., and certain parts of Bihar and M. P., Kamiauti in other parts of Bihar; Gochi in Orissa and certain parts of Madras; Vath in some parts of Madras; Hali in Gujarat; Panniyal in Tamilnad, Gassigully in Andhra;

of forced labour is prevalent not only Madras in various districts but also in Bombay, Hyderabad and M.P. In Bombay all jungle tract tenants are liable to be called upon to work for their landlords. This forced labour is demanded for as many days as are necessary for the landlord's requirements....The maximum remuneration is 1 anna per day. More often rice is given, barely sufficient for one man for one meal. If the landlord is also a forest contractor he will use his tenants' labour by *veth* for working his coupes.³⁵

The system of debt bondage had reduced the aborigines to a state of servitude in which they work for third parties for a bare subsistence. In Hyderabad, the aborigines have been forced to work 10 days in every year in teak plantations and to bring with them their own ploughs and bullocks, and they are not paid for this work.³⁶

In M. P. also in localities vestiges of forced labour are still encountered. The workers supply in interior villages free labour, services and articles in demand by landholders. Straw for cattle, and storing grains, vegetables for festivals and fruits, timber, fuel, free bullock cart service for Diwali and other festivals are common articles and services supplied to the landholders by labourers.³⁷

If they take loans it is often granted at a very high rate of interest from 25 to 50 percent. The small loan in a year accumulates like snowball which, being irrepayable, ties the tenant to the moneylender. Sometimes the servant is transferred to another landlord who repays the loan to the previous landholders.³⁸ Forest contractors illegally collect fees from the aborigines for use of fruits and flowers of forest trees; when they combine shop-keeping the aboriginal slaves supply valuable produce to contractors in exchange for trinkets.

In Bihar the Kamias are bond servants of their masters; in return for a loan received they bind them to perform whatever menial services are required of them in lieu of the interest due on the loan.

Even the local government officials in various parts of the

Bhagia in Hyderabad; Jeetham in Karnatak; Barsalia and Shalkari in M.P.; Haliyas and Choras in Kumaon; Chakar in Orissa; Dublas and Kolis in Bombay. (see *Agricultural Problems of India*, 1953, p. 169).

35 Quoted by K. G. Siwaswamy in *Serf Labour Among the Aborigines*, in *Indian Journal of Social Work*, p. 31.

36 C. F. Haimendorf, *Tribal Hyderabad*, 1945.

37 Quoted by P. N. Sengupta, 'The Diaries of the Primitive Tribes of India', in *March of India*, Vol. VI, No. 2, 1953, p. 60.

country were in the habit, until recently, of exacting services and compulsory labour from tribes under the Criminal Tribes Act of 1934.

Food and Housing of the Tribes. As a rule, the living standard of the aboriginal population is extremely low. In many parts they stagnate in conditions of economic destitution and pronounced cultural and technical backwardness, which severely limit their production and consumption capacity. This is due to the primitive conditions in which they are obliged to earn their living, to the lack of educational stimuli and opportunities and to the almost complete absence, in some parts, of welfare services and measures for social and labour protection.

In this note we shall be dealing with the problems like the dietaries, the housing conditions, health, and literacy, etc.

DIETARIES

Studies undertaken in India and other parts of the world reveal several important facts about the dietary habits of the aboriginal peoples, but the actual intake of calories, proteins, minerals and vitamins by them is not known. Nevertheless, the data examined provide valuable information regarding the wide variations in diets of the primitive peoples.

Of all the primitive tribes of the world, the Eskimos are prevailingly carnivorous, living mainly on the marine animals like the seal, polar bear, whale, walrus, arctic hare and eggs of arctic birds. Their diet is not complete and lacks starchy food. But the Eskimos are strong, vigorous and have unlimited energy. The Ainus of Japanese island, Yezo, are also carnivorous. They are hunters and eat the flesh of fox, wolf, horse, fowl and some varieties of fishes in abundance. They also depend on a few vegetables, herbs and edible roots. While the Hunzas of the upper valleys of the Karakoram live entirely on fruits and agricultural produce and yet possess better endurance and superior physical strength. Their diet is rich and nutritive, consisting of wheat, barley, milk, ghee, butter-milk, pulses, millets, beans, potatoes, green vegetables and fruits like apricots, mulberries, etc. Occasionally they take meat and drink home-made wine of good grapes. In the words of Sir Robert McCarrison: "These people are unsurpassed by the Indian race in perfection of physiques, they are long lived, vigorous in youth and age, capable of great endurance and enjoy a remarkable freedom from disease in general. Their diets are unsophisticated foods of nature and the healthiest diets of mankind."³⁷ The Bakitara Nyaza—and the Todas of Nilgiris are prevailingly lacto-vegetarians.

³⁷ P. N. Sengupta, 'Dietaries of the Primitive Tribes', in *The Adavisis*, 1955, p. 90.

At this stage it may be pointed out that there appears to be no uniformity in the type of food taken by the different tribes but there seems to be some relation in the type of food consumed by them and the climatic conditions of their environments. Herbivorous tribes appear to be the most numerous, the carnivorous and the omnivorous coming next and the lactivorous last. But in the absence of any systematic investigations and the availability of complete data, it is possible to know only the variations in the actual consumption of food groups and not the actual intake of calories, proteins, and minerals like calcium, phosphorus and iron.

Like the diets of the primitive tribes in other parts of the world, the diet of the aborigines in India varies according to the stage of their development and the areas they inhabit. Some of the tribes that rank as the most primitive live on forest products, as tubers, fruits and roots and such fish and animals as they can catch. In general, these tribes are omnivorous and there are few limits to what they will accept as food. Others at a higher level of development eat beef and produce their food by more or less permanent cultivation or jhum cultivation.³⁹

The Anthropological Department of the Government of India has for some time past undertaken extensive systematic investigations on the dietaries, nutrition and adequacy of food, the general cause of various ailments, the birth and death rates, the expectation of life, the rate of growth among children, basal metabolism, etc., among the primitive tribes of India—first in the Abor hills on the North East Frontier of India and then in southern India in Travancore hills. As a result of these surveys, much useful information is now available about the dietaries of these people and its effect on the constitution of the tribes.

Starting from south India we find that the staple food of the Paliayns consists of roots (the wild yam), honey and flesh of animals and birds. They also eat cumbu and cholam. They do not eat beef. They obtain game by means of traps.⁴⁰

The food of the Chenchu consists chiefly of roots (gaddalu) and berries (pandulu); herbs and fungi are also eaten; tamarind fruits are eaten mixed with ashes obtained by burning the bark of the same tree; mahua flower is eaten boiled. No salt is added to the food. They eat animal flesh when available, the skin is also eaten after the hair has been singed and the intestines after cleaning.⁴¹

39 A. Aiyappan, *Report on the Socio-Economic Conditions of the Aboriginal Tribes in the Province of Madras, 1948*, pp. 63—79.

40 R. Faulks, 'A Note on the Paliyans of the Madura district', in *Census of India, 1931*, Vol. I, Pt. III-B, p. 196.

41 G. A. Khan, *The Chenchu*, *Ibid.*, p. 210.

The Kadar like "all sorts of game and fish, but the bison and the bear are two animals which no Kadar will touch, living or dead. They are very fond of honey."⁴²

Kodo, Kutki, Pej (gruel) and vegetables and tender leaves of trees, particularly 'pipal' and roots form the diet of Gonds. They would not spare any animal for the sake of flesh, even snakes and crocodiles would be their favourite dish. They love liquor brewn from mahua flowers.⁴³

Murias also take rice at night and Pej prepared of broken rice pieces or millets usually in the day time. They are non-vegetarians but not beef-eaters.⁴⁴

The Todas of the Nilgiris take mainly milk, ghee, butter milk, curd, some cereal grains, sugar, herbs and fruits. In the olden times they lived only on herbs, fruits, honey and milk products.⁴⁵

The rice and nagli are the staple food of the Warlis. They eat leafy vegetables and fish if available. They also eat dry fish, fowls and flesh of such wild animals, like boar, hare and deer. When they do not get normal food they eat bitter kands (big round roots grown below the soil) from the jungle, after boiling them for over 12 hours.⁴⁶

The Katkaris of Bombay province eat rice, nagli, river fish, field crabs and rats. Occasionally they eat fish.

The food taken by the Bhils is very coarse and poor but nutritious. It consists chiefly of maize, kuri, kodra, mal.⁴⁷ They also take meat and are habituated to drink mahua malt extracted from the flower of widely grown mahua tree in the neighbouring areas of Rajasthan, Bombay and Madhya Bharat.

The Baigas of Vindhya Pradesh are addicted to liquor, their main diet is a coarse type of rice (koda) and jowar, pigs and hens are freely used.⁴⁸

One subdivision of Oraons is considered purer than the rest because it refuses to eat rats and lizards, a part of the daily of diets of the others.⁴⁹

42 K. G. Menon, *The Kadar of Cochin*, in *Census of India*, *Op. Cit.*, p. 213

43 K. A. Gafoor, *Tribes and Tribal Welfare in Hyderabad*, 1952, p. 16.

44 S. R. Dass, 'Bhatras and Murias', in *Tribes of India*, Pt. I, 1950, p. 50.

45 P. N. Sengupta, *Op. Cit.*, p. 90.

46 K. J. Save, Warlis and Katkaris, *Ibid.*, Pt. I, pp. 165-67.

47 B. S. Mehta, The Bhils, Meenas, in *Tribes of India*, Pt. I, p. 211.

48 A. B. Lall, Baigas, *Ibid.*, p. 236.

49 W. H. Gilbert, *People of India*, pp. 75-81.

In Uttar Pradesh, maize and various kinds of millets constitute the basic food of the Korwas, the Kharwars, the Ghasi and Chero. But rice is a luxury. The Korwa are among the only people who will eat bear, pig, fowls, ox, buffalo and deer while Ghasi are fond of pork and goat.

The Panika will eat anything except the flesh of cows and buffaloes, horses, crocodiles, snakes and lizards, while the Buia eat both beef and crocodile. The Kharwar, having become Hinduised, refuse fowls and pork.⁵⁰

The Raji of Askot in the Himalayas live mainly on tubers and other natural vegetable foods supplemented by rice and millet raised in forest clearings and fish, birds, and certain wild animals. They are generally omnivorous.⁵¹

The Abors of Assam practise jhum, and therefore, eat cereals, millets, chillies, vegetables, like arvis, yams, pumpkins, brinjals, ginger, onions and stems and flowers of some wild plantain trees. Leaves of wild plants are also taken by them in large quantities. Pigs and chickens, fish and deer, wild boar, squirrels, wild cats and birds supply them with meat. Apong (slightly fermented beverage) is very common among them. They do not know how to use milk as food. Sugar and jaggery are not available to them.⁵²

The diet of the Urali and Kanikkar tribes of Travancore hills is very inadequate. They live mainly on tapioca, small quantities of rice, some wild roots and yams. Meat, fish, milk and milk products do not form the part of their diet. They have no fermented or intoxicating native beverage.⁵³

Shri Sengupta enables us to compare the average daily diet of various food groups in ounces, among the non-tribal Indians, the Abors, and the Uralis, in the following table.⁵⁴

Food	Non-tribal Indians	Abors	Uralis	Recom- mended for non-tribal Indians
Rice	16.6	25.4	7.1	14.0 (Cereals)
Other cereals .. .. .	..	0.3	21.4	..
Millets and Pulses	2.3	0.5	1.1	3.0
Green leafy vegetables	0.9	1.8	0.04	4.0
Other vegetables	4.1	1.4	16.9	6.0

⁵⁰ D. N. Majumdar, *The Fortunes of Primitive Tribes*, 1914.

⁵¹ S. D. Pant, *Social Economy of the Himalayas*, pp. 88-89.

⁵² P. U. Sengupta, *Op. Cit.*, pp. 61-61.

⁵³ P. N. Sengupta, *Op. cit.*, p. 62.

⁵⁴ P. N. Sengupta, *Op. Cit.*, p. 63.

Flesh foods	..	..	0.9	1.4	Nil	4.0
Fats oils	..	..	0.9	Nil	0.2	2.0
Milk, etc.	..	..	3.3	Nil	Nil	10.0
Fruits	..	..	0.6	0.6	0.5	3.0
Sugar-jaggery	..	..	0.7	Nil	Nil	2.0
Drink (pints)	..	..	..	0.9	Nil	..

An analysis of the table shows that according to calories, proteins, minerals and vitamins intake, the Abors get 16 per cent more calories and the Uralis about 9 percent less than the average Indian. The consumption of proteins is about 17 per cent more among the Abors and about 67 percent less among the Uralis than what the Indians get. The calcium intake is about 70 percent more in the case of Abors and 50 percent less in the case of Uralis than intake among the Indians. As regards Vitamin A, the Abors and Uralis are respectively getting 33 percent more and 21 percent less than what an average Indian gets.

It may be well remarked that in spite of the wholesome nature of the diet of the two aboriginal tribes, it suffers from several defects. For instance, the calory intake is not in accordance with the climate, body-size and work; animal protein of high biological value is inadequate and calcium is supplied by the green leafy vegetables, the maximum value of which may not be absorbed in the system.

HEALTH

The health of the aborigines in India is stated to be on the whole above the average of that of the people inhabiting the plains, unless intensive culture-contact, through coolie labour or other agencies, has set in. Where the aboriginal still lives from forest produce or shifting cultivation, his general level of health is better than that of the plains-man, mainly because malnutrition is less pronounced. The same is reported of skin and respiratory diseases.

Abandonment of their original mixed diet in favour of rice diet has caused dysentery and cholera to spread. Scabies, ringworm, skin and venereal diseases are now more frequently found. Wounds and fractures, because of lack of proper treatment are frequent, cases of death or permanent mutilation.

In Assam, closer contact with civilization has brought about an increase in diseases. "Not only have some specific diseases, such as venereal disease and T.B., been introduced but epidemics spread more quickly."⁵⁵ In mining areas of Bihar and Orissa, the malaria incidence has been brought down to the

⁵⁵ J. P. Mills, *Census of India, 1931, Vol. I, Pt. III-B, p. 147.*

minimum so that the general health of the people is satisfactory.⁵⁶ In Bombay and south-eastern Aravalli hills the general health of the aboriginal is poor, the most common disease being malaria, scurvy, guinea-worm, and others resulting from unhealthy climate, use of drinking water from the step-wells, and the malnutrition. Treatment by witch-doctors and magic are most frequently resorted to by the aborigines. Among the Abors, the high incidence of goiter is found both among the males and the females, the main cause of this is the deficiency of iodine which perhaps can be explained because of the distance from the sea. There is no goiter among the Uralis and Kanikkars of Travancore.⁵⁷

In the south malnutrition has caused ravages among the tribes as a result principally of change from wholesome forest produce to rice diet, accompanied by arrack and opium introduced by forest contractors. Mainly through contacts with outsiders, the Kaddars suffer from cholera, small-pox, diabetes and albuminaria.⁵⁸ The Koya also suffer (together with the Reddi and the other tribes of the south) from yaws.⁵⁹ More particularly in Travancore, it is stated that leprosy is now found among the Kanikkars, the Muduvan, and the Vishawan, elephantiasis among the Kanikkars; syphilis among the Paliyan; and small-pox among the Muduvan, the Mannan and others. All hill tribes are subject to malaria, to which many fall victim.⁶⁰

Scientific medical care, both preventive and curative, is inadequate in the majority of the areas inhabited by aboriginals. For economic reasons, a very high percentage of doctors, pharmacists, nurses and social workers, is concentrated in the capital cities and other industrial and urban centres, at great distances from areas with a large tribal population. The situation is aggravated by the survival among tribals of empirical practices of mythical or religious origin in matters of food, illness, child-bearing and weaning, and illiteracy of an extremely high proportion of the tribal people.

Modern medicines have not found favour with these people because of the superstition and lack of faith in them. They have their own medicine-men, their own methods of diagnosis and cure and diseases are generally attributed to the work of evil spirits. So that whenever diseases break out these medicine-men are called for. The attitude of the tribal people can be changed if not only the administrators but also the doctors and to the Indonesian Islands of Melanesia.

⁵⁶ *Indigenous People*, 1954, p. 149.

⁵⁷ P. N. Sengupta, *Op. Cit.*, p. 97.

⁵⁸ A. Aiyappan, *Op. Cit.*, p. 63.

⁵⁹ K. G. Menon, *Census of India*, 1931, Vol. I, Pt. III-B, p. 215.

⁶⁰ *Ibid.*, pp. 237-8.

medical practitioners approach these people in a spirit of love, without any desire to impose themselves on them. By patience, skill and sheer friendliness, the barriers can be broken down and then those who never have known relief from pain and fever will come to them with gratitude and hope. Indigenous systems of medicine must be explored and simple natural remedies used, whenever possible. In this way, the healing touch of science will reach the tribes, naturally and inevitably.

LITERACY

In view of the low percentage of literacy for the country as a whole—only 16.6% (for males, 24.9% and for females, 7.9% in 1951)—it is not surprising that nearly whole of the tribal people are illiterate. According to 1931 Census figures of 76,11,803 persons belonging to tribal group, 61,67,452 were illiterate, i.e., only 0.58% were literate.⁶¹ Although 1951 Census figures for literacy among the tribals is not available, there is no reason to believe that there has been any change in the situation. Not to say middle, high school and college education even the primary education is negligible among the aborigines. The following table indicates the literacy per 1,000 aged 5 and over in tribals as compared with other important religious groups in the country since 1901 to 1931:⁶²

Literacy per 1,000 aged 5 and over

Community	1901	1911	1921	1931
Tribals	4	16	9	..
Muslims	33	38	53	64
Hindus	50	55	75	84
Sikhs	59	67	68	91
Christians	211	217	285	279
Jains	252	275	341	353
Parsis	649	711	794	791

Taking the figure for 1921 and 1931 communities, it appears that whilst other communities, including the tribals, have shown progress, there had been a decline in the literacy of the Parsi and Christian community. According to the Census report it had been due to economic depression in the case of the former and due to the inclusion of illiterate converts coming largely from the tribals and lower Hindu castes in the case of the latter.

⁶¹ *Census of India, 1931, Vol. I, Pt. II, p. 427.*

⁶² *Census of India 1901, Vol. I, Pt. I, p. 177; Ibid for 1911, p. 311; India for*

The low figure of literacy among the tribes is to be expected for the following reasons:

1. Not only are there few schools in villages inhabited by the aborigines but the people cannot afford or do not wish to send their children to urban or rural schools situated far from their villages.
2. Because of inaccessibility of the indigenous areas, very few teachers are available who may be willing to work among the aborigines or to stay for a reasonable period of time in the areas unsuited to their taste and devoid of all facilities of modern life, to which our present youths are usually accustomed to.
3. There is also the difficulty of the language. There are not enough people who know tribal languages.
4. The aborigines themselves do not take the advantage of the facilities offered, the schools being for the most part situated in or near places not easily accessible to them.⁶³

For some time past, indigenous education has made considerable strides in Assam, though this system does not result in literacy as it is known in the West.⁶⁴ Such education as has been imparted to the Nagas has not been an unmixed blessing for there is a surplus of half educated youths, unwilling to go back to the village life of their fathers and looking in vain for employment which they consider suitable for their talents.⁶⁵ The Lushais also dislike manual labour, thus increasing the number of unemployed and discontented youths.⁶⁶ So also literacy among the Kadar has tended to make them dissatisfied and unfit both for their own mode of living and for any other. In Travancore too, education has undermined their tribal ways and encouraged an attitude of contempt towards manual labour.

A special syllabus should be drawn up for the primary stages, incorporating activities familiar to the tribal folk, and later it should incorporate lessons bearing on the culture of their neighbours. The medium of instruction must naturally be the mother tongue, tribal language spoken at home. The regional language should have its place as a subject of study in the upper forms. Regarding the script to be adopted the solution is not so easy. The tribal people should adopt the script of the regional language of the State, if the State has a single

1921, p. 186 and *Ibid* for 1931, p. 329. Later figures are not available.

⁶³ A. V. Thakkar, *The Problem of Aborigines in India*, pp. 15-17.

⁶⁴ N. K. Rustomji, 'Glimpses of Tribal Life in North-East Frontiers', in *Amrita Bazar Patrika*, Puja Number, 1950, pp. 131-42.

⁶⁵ J. P. Mills, *Op. Cit.*, pp. 147-48.

⁶⁶ C. H. Helme, *Census of India*, 1931, Vol. I, Pt. III-B, p. 119.

script. A few new phonemes, to represent sounds peculiar to the tribal language, should, however, be added. These should be drawn up bearing in mind the need of new phonemes for the various tribal languages, so that no symbol should have more than one sound, nor should the same sound be indicated by more than one symbol in different areas.

HOUSING CONDITIONS

The aboriginal dwelling is generally always damp, insufficiently ventilated, over-crowded and devoid of most rudimentary sanitary facilities, all of which factors strongly favour the spread of respiratory and digestive disease, malaria, etc. In fact, aboriginal dwellings in trees are found in the continuous belt, from south India (especially among the Kanikkar and Mandavar in the extreme south) and sometimes among the Irulas of the eastern Nilgiris hills, to Assam (among Garo) and various parts of Indo-China as far as the Miao country on the Chinese frontier.⁶⁷ The houses are usually mere huts made of forest saplings and branches and covered with leaf thatching. The floor is sometimes raised by dumping earth and beating it down into a platform.⁶⁸

In Travancore the Kanikkar, the Mannam, Muduvan, Paliyan do not raise floors of their huts above ground level and hence drainage and sanitation are defective. In Madras, the pastoral Toda of the Nilgiris have a type of dwelling peculiar to them—It is rectangular built of wood and thatch, with an ogival roof. The Paniyans live in poorly constructed low huts built of bamboo and leaves. A number of huts form hamlet. The houses of Lyngngum Khasi in central Assam are long rectangular pile dwellings, raised a little above the ground at entrance which faces the inner square of the village.

The houses of the Bhils living in the hilly country is different from those of the plains. In the plains they live in villages close together, while in the hilly country the living is of the scattered type. The house about 10'×8' has low roofs, scarcely 6' high, mostly thatched and in some cases tiled, supported by four mud walls with no window, hole or aperture of any kind for light or air protected by a door of bamboo matting. The size of the Kharia settlements differs according to their cultural stage. The hill Kharias live in groups of five to ten families, in huts scattered over the hillside at distances of a hundred yards or more, but the more advanced Dhelki Kharias live in regular villages with sacred groves, dancing arenas and the village burial ground where the bones of the deceased relatives are

⁶⁷ G. Montandon, quoted in I. L. O's, *Indigenous People*, p. 119.

⁶⁸ P.G. Meenon, 'Kadars of Cochin,' in *Census of India*, Vol. I, Pt. III-B.

ceremonially interred at intervals. The Christian Kharia villages are neat, and more compact, with the houses more substantially built. The hill Kharias and also the Dhelkis build dormitories, where the bachelors and the maidens live separate, but the Christian villages have abandoned the practice.

Raw meat is not eaten by the Kharias and beef is unpopular with all sections of the tribe. Salt is very popular with them and they take plenty of it with their food; meat is salted and dried, vegetables are boiled with salt, and the advanced section of the Kharias have learnt to prepare curry with vegetables, onion, powdered turmeric, pulses and meat, salted to taste. This preference for salt may lead to some physiological change and such aspects of nutrition in primitive society require careful investigations. The Kharias have experimented with all kinds of leaves and tubers as good and developed a taste for a large number of leaves and flowers. The Kuki villages consist of tiny settlements in the jungles, of four to five huts, built of bamboo and cane. The Kukis are 'by temperament nomadic'. The peculiar vagabond strain if not controlled leads to villages splitting into hamlets and the latter sub-dividing till, as in Manipur hills, we find single houses in the midst of the dense jungle several miles from the next habitation. In the jungle, the nomad Kuki builds lightly and a habitation of sorts can be erected in a few hours with bamboo mats as walls and with leaves for the thatch to keep out the rain. Where the Kukis live a settled life, they construct large solidly built houses, 50 to 60 ft. long, 15 to 20 ft. wide and 7 to 10 ft. high. The houses are built on long bamboo poles, the lower halves of which when covered up provided accommodation for cattle and pigs. Each house has a few bamboo cages, kept on either side of the entrance, in which fowl and pigeons are kept.

SOCIAL AND CIVIL CONDITIONS OF TRIBES

Apart from the general disparity of sexes in the country, there is found a great inequality of sexes between different socio-economic groups too. Among the major communities of India, the scarcity of females is the largest. In 1931, the Sikhs had only 78 females for every 100 males as against 95 females in the case of Hindus and Christians; 90 in Muslims and 94 in Jains and Parsis. The tribals had slight excess of females. In 1951, the position was something like this: there were 84 females among the Sikhs, 94 among the Hindus, 99 among the Christians, 92 among the Jains, 98 among the Parsis, 94 among the Muslims and 95 among the Tribals per 100 males. The following table gives the sex distribution of population in the important religious groups since 1891.⁶⁹

⁶⁹ *Census of India.*

Females per 1,000 males

Community	1891	1901	1921	1931	1951
Hindus	962	969	954	953	948
Muslims	940	937	909	904	944
<i>Tribals</i>	991	1,016	996	1,009	951
Christians	913	935	935	952	992
Jains	N.A.	N.A.	931	941	927
Sikhs	N.A.	N.A.	755	784	848
Parsis	N.A.	N.A.	944	940	982
India	958	963	945	941	947

It will be observed that in comparison to other communities, tribals have, except Christians, Jains and Parsis, a higher number of females per 1,000 males; this is because they have generally late marriages, and hence the early years of greater fertility are over by the time marriage is contracted.

MENARCHE

Most of our data about the primitive tribes are of a pre-functory nature. The statistical value of the accounts given by the travellers, missionaries and the anthropologists is very dubious. The data regarding the age of menarche among the tribal people are even more so. Of course, some data have been collected by eminent workers in the field, like those of Dr. Elwin or Dr. Majumdar. According to Dr. Elwin, the most likely age for the menarche among the tribal people of Madhya Pradesh is between 12 and 15. Dr. Majumdar examined 367 girls, all of them in their teens, of seven tribes of northern India, of which only the Hos, the Korwas, and the Tharus provided most reliable datas. Out of the total number, only 12 had their first menstruation below 10 years, only 12 had their first menstruation below 10 years, 97 had it between 10-12; 191 between 12-14; 56 between 14-16 and 11 at 16 and above. Calculated on the percentage basis, 3.3% of the cases were below 10 years; 26.4% between 10 and 12 years; 52% were between 12 and 14 years; and 15.3% between 14 and 16 years; and only 3% above 16 and over. Thus, it will be observed that in 78.40% of the cases, the age of menarche among the tribal girls was between 12 and 14 compared with 92.0% among the girls of all races in India. Secondly, menstruation appears at early age among the Mongoloid tribes—the Garos, the Kukis, and Tharus—which dis-

tinguish them from the Australoid or pre-Dravidian tribes, like the Hos, Mundas, and others.⁷⁰

As compared to the Tribals, 80 percent of the Indian girls (according to the Age of Consent Committee) get their menstruation between 12 and 15 years. J. Robinson found 12 years 4 months as average age for menarche in Hindu girls of Calcutta; 13 years 2 months in Madras; and 13 years 3 months in Bombay. In cool climates the period sets in at a bit higher age. Kreiger observes that the average age for menstruation in Christian is 16 years 9 months 25 days; it is 15 years 7 months 25 days in Berlin; 15 years 1 month 14 days in London; and 14 years 5 months 29 days in Layon.⁷¹

MARRIAGE

Between menstruation and motherhood, there is a longer gap among the tribal women than is noticed among others. Marriage is usually late but practised almost universally in the tribal society, the only exception being the Hos of Kolhan. From the Census statistics, 1931, we find that there were 687 wives per 1,000 females between the ages of 15 to 20 as compared to 564 among the Christians, 909 among the Hindus, and the similar number among the Muslims. The following table gives the marital status by religion, in percentages, for India in 1931:⁷²

MARITAL STATUS OF WOMEN AGED 15—19 BY RELIGION
(IN PERCENTAGES)

Community	Unmarried	Married	Widowed
Jain	4	78	18
Hindus	4	80	16
Muslims	5	85	10
Sikhs	8	87	15
Tribals	10	80	10
Christians	15	80	5
Buddhists	15	50	5
Parsis	45	50	5

Thus it will be seen that all the religious groups sharply differ in marital status.

Child marriage is practically absent among the tribes, though of late many tribes have introduced child marriage under the influence of Hindu culture. In Chota Nagpur, the more well-to-do families of Santhals, Mundas and the Oraons

⁷⁰ D. N. Majumdar, *Matrix of Indian Culture*, pp. 78-80.

⁷¹ Carr Saunders, *World Population Problem*, p. 91.

have come into close contact with the Hindus. Among them the age of marriage for girls has come down to even 9 or 10 and for the boys to 12 or 13. The same is the case with the Bhils of Gujerat and Nimar division in M. P. But, among the Nagas and Kukis of Assam, girls marry between the ages of 15 to 20 and the boys between the ages of 18 and 25. Some tribes like the Hos and the Mundas of Chota Nagpur, marry their girls pretty late. The high bride price necessary for marriage makes it difficult for the youngman to marry, and marriage is consequently postponed till late in life. Girls seldom marry before 18 and 20 and men seldom below 25 or even 30. In other tribes in Northern India too, the average marriage age of girls does not fall below 20 or go above 26.

The groom is usually older than the bride in the tribal areas, but the opposite is not unknown in Assam, e.g., among the Purum Kukis. Usually, the difference in the age of husband and wife is never below 15. Many of the cases of rape, abduction, disparity in the ages of husband and the wife. More often than not, a man is married at the age of 35 to a girl of 15 so that when he is 50 the girl is 30. The psycho-sexual life of a woman demands her normal sexual life to continue while the husband may feel it otherwise. This great difference in age between husband and wife reacts adversely on the fertility of the wife.

PRE-MARITAL AND EXTRA-MARITAL SEX RELATIONS

There is considerable opportunity for the satisfaction of the sex impulses outside marriage among the tribals of India. Pre-marital sexual chastity is not very rigidly insisted upon in a large number of tribes. Among the Muria Gonds of Bastar, according to Dr. Elwin, bachelors and maidens of a village pass the night in a common house where they pair off according to their choice. The mates are changed occasionally or regularly. This continues till they are married and leave the organisation. Marriage between the mates of the Ghotul (Bachelor's House) is very rare.⁷³ Each Oraon bachelor had a sweet-heart in the spinster's house half a century ago. If a girl refused to accept a lover, she was 'cut' off by the older girls who refused to dance with her till she accepted a paramour. The Bachelors' House organisation has now gone underground, and it is difficult to say what the present conditions are.⁷⁴ Among the Naga tribes also we find similar pre-nuptial laxity. "The Aos," writes Dr. Hutton, "are notorious for the unchastity of their women. From a tender age girls are free to do as they like before marriage, and are thus with difficulty prevented from doing so afterwards."

⁷² *Census of India, 1931.*

⁷³ Elwin, *The Murias and their Ghotul*, p. 333.

⁷⁴ S.C. Roy, *The Oraons*, pp. 246-7.

The unmarried girls sleep in small houses, built for the purpose, in twos or threes, and the unmarried men sleep with them."⁷⁵ Only adult marriage is in vogue among the Ao Nagas, according to Smith, "but, prior to wedlock the girls are allowed great freedom. It is said that Naga tribes, who are entitled to wear the "orange blossom of virginity" on the wedding day, are very rare. The girls sleep by twos or threes in separate houses or in the houses of widows, where they are visited nightly by their lovers."⁷⁶ Girls among the Angami Nagas consider short hair—the symbol of virginity—to be a disgrace and are very anxious to become entitled to wear it long.⁷⁷ Post-martial laxity is also not unknown among the tribes of other parts. During the more important festivals, such as the Magh Parab among the Hos and the Khaddi among the Oraon, men and women freely indulge in sex-relations. It may, therefore, safely be said that there is considerable opportunity for the satisfaction of sex-desires outside the marital tie among at least some of the tribals of India; yet we find that marriage is universal among them. It may, hence, be concluded that sex activity is not the main objective of marriage. Economic co-operation seems to be the basis for marital union, though emotional inter-stimulation and procreation of children as motives of marriage also exist.

Pre-marital sex-laxity is also observable in other tribes of the world. Among the Port Barrow Eskimos, according to Murdoch, "promiscuous sexual intercourse between married and unmarried people, or even among the children appears to be looked upon merely as a matter for amusement."⁷⁸ Of the Indians of the North-west, U.S.A., Gibbs writes, "Cohabitation of unmarried females among their own people brings no disgrace if unaccompanied by child birth. . . . This commences at a very early age, perhaps ten or twelve years."⁷⁹ Speaking of the Columbian Indians, Bancroft says: "Unmarried women have not the slightest idea of chastity, and freely bestow their favours in return for a kindness, or for a very small consideration in property paid to themselves or parents."⁸⁰ Powers thinks, "There is scarcely an attribute known as virtue or chastity in either sex before marriage among the California Indians."⁸¹ Writing of conditions in Africa, Johnston says, "As regards the little girls, over nearly the whole of British Central Africa, chastity before puberty is an unknown condition. Before a girl is to become

⁷⁵ Dr. J. Hutton, *The Angami Nagas*, p. 374.

⁷⁶ W. C. Smith, *The Ao Nagas Tribe of Assam*, p. 57.

⁷⁷ Compare Westmarck, *The Origin and Development of Moral Ideas*, Vol. II, p. 423.

⁷⁸ *Ethnological Results of the Port-Barrow Expedition*.

⁷⁹ Gibbs, *The Tribes of Western Washington and North-west Oregon*, Vol. I, p. 199.

⁸⁰ Bancroft, *The Native Races of the Pacific States of North America*, Vol. I, p. 242.

⁸¹ *The Tribes of California*, U. S. A., Geog., and Geol. Survey, Vol. III, p. 157.

a woman it is a matter of absolute indifference what she does, and scarcely any girl remains a virgin after about five years of age."⁸² Weeks says that among the Bangala, "above the age of five years it would be impossible to find a girl who was a virgin."⁸³ "If," writes Willoughby, "there is ever a time when Bantu boys and girls are not familiar with sexual subjects, it must be in the year when they have not yet become familiar with anything. Little effort is made to shield children from sexual contaminations; but, on the contrary, it adds spice to the elders' amusement when little voices try to sing these fearful songs, and small children ape their parents' vices. Nothing seems to matter till puberty is approached; and then there is a sudden attempt to look after the girls."⁸⁴ In regard to the people of Burma, Webb writes: "Among many of the tribes, there is great moral laxity prior to marriage. Thus, among the Siyin and Sokte tribes of the Chins, female virtue is not expected, provided an unmarried girl takes the precautions to prevent motherhood before marriage. Boys and girls sleep together without hindrance, and a young man openly cohabits with his mistress in the house of her parents. Similarly, among the Kachins, young people are allowed to consort as they please before marriage, though the marriage prohibitions are usually observed even in pre-marital intercourse. Special bachelors' huts are placed at the disposal of any couple who wish to try the experiment with each other. The experiments are continued indefinitely on both sides until a suitable match is found, and then marriage ensues. It is claimed that unchastity after marriage does not exist, owing to the freedom of experiment before marriage."⁸⁵ Of the people of New Zealand, writes Best, "that a girl would have intercourse with a youth before she arrived at puberty. At times marriage took place and was consummated at this early age."⁸⁶ "It would appear", says Hartland, "that sexual intercourse before puberty is either recognized by a formal marriage or tolerated as the gratification of a natural instinct among a great variety of people in all quarters of the globe."

The selection of mates is an important affair even in primitive society. The rules of endogamy, exogamy, hypergamy, preferential mating and prohibited degrees operate simultaneously and thereby considerably restrict the freedom of choice. Thus, a Santhal has to marry within his own tribe, but not of his own clan. Among the Purum Kukis of Manipur, marriage

⁸² *British Central Africa*, p. 409.

⁸³ *The Bengal of the Upper Congo*, *Journal of the Anthropological Institute*, Vol. XXXIX, 1909, p. 442.

⁸⁴ *Race Problem in New Africa*, 1923, p. 127.

⁸⁵ *Census of India 1911*, Vol. IX, Burma, Pt. I, p. 143.

⁸⁶ *The Peopling of New Zealand Man*, Vol. XIV, 1914, p. 32.

⁸⁷ *The Primitive Paternity*, 1909, Vol. I, p. 32.

between cross-cousins is preferred.⁸⁸ A Garo man has to marry his mother-in-law as she is the owner of that family's property. Marriage between grand-parents and grand-children has also been reported from amongst the Gonds of M.P. Among the Lakhers of Lushai Hills, marriage with the widowed step-mother and with the widow of the son is also found.⁸⁹ In the Bhils of Bombay and Rajasthan, widow remarriage is commonly practised and if there is no one to look after her children, she takes them with her to the new husband. A younger brother can keep the widow of his elder brother, but not vice versa.⁹⁰

The means of acquiring a mate in tribal society are varied and interesting. In the primitive society, payment is the most common way of securing a wife. The amount, of course, varies according to the economic conditions of the tribe. The Santhals, Hos, Mundas, Kharias, Oraons, Gonds, Nagas, Kukis, Bhils and others pay for their brides as a general rule. But, even amongst them, there are also found other means of getting a wife which may be discussed here briefly.

1. Marriage by service is the only way to secure a bride among the Purums of Manipur. The prospective groom has to serve in the house of his bride's father for 3 years. He may be employed to do any work that the sons of the house may be required to perform. He has boarding and lodging during this period in the house of his prospective father-in-law.⁹¹ This practice is also found among the Rangkhols, Kukis, Aimols, Anals, and Chirus.

2. Marriage by capture is another method found among many of the Chota Nagpur tribes, such as the Hos, Santhals, Mundas, Bhumijas, and others. In the negotiated marriages too, the father of the girl requests the groom to take the bride away by force. The date and time for this is arranged mutually; the bride shows some resistance, but ultimately allows herself to be abducted. Such an abduction-marriage increases the prestige of the bride's parents.

When a boy falls in love with a girl who does not reciprocate his feelings or when her father is not agreeable to the match, the boy may force their hands by simply putting a vermillion mark on the forehead of the girl, which constitutes formal marriage. Soon after this, the boy leaves the village and remains in hiding till the matter is settled between the guardians of both the parties. This is found among Santhals, Bhumijas, Hos, Mundas and other tribes of Chota Nagpur and Orissa.

⁸⁸ T. C. Dass, *The Purums*, p. 241.

⁸⁹ Parry: *The Lakhers*, p. 294.

⁹⁰ *Races and Culture of India*, D. N. Majumdar, p. 145.

⁹¹ T. C. Dass, *Op Cit.*, p. 242.

3. Marriage by elopement is another method common among these tribes. When a boy and a girl love each other but their parents are not agreeable to the match, the parties take resort to this means. After two or three months they come back to the village and are accepted as husband and wife.

4. Intrusion-marriage is another peculiar method of securing a mate, which is generally found among the Santhals and other tribes. Here the initiative is taken by the bride. When a boy has intimate relations with a girl whom he promises to marry but postpones the ceremony continuously, she stealthily enters his hut one early morning and takes her seat in one corner. The mother of the boy tries to drive out the girl by all means. If the girl sticks to her position to the last, she wins her case. The neighbours assemble in the courtyard, and the boy is forced to marry.

5. Marriage by settlement is usually common among the Bhils.

In India, we have all the forms of marital life among the tribes, *viz.*, monogamy, polyandry and polygyny. Of all these, monogamy is the most prevalent form, but it is not obligatory for any tribe. Polyandry is practised among the Todas of the South and the Jaunsar Bawar of the Himalayas, where there is either paucity of females as among the Todas, or where poverty is very rampant as in Jaunsar Bawar so that family property is kept undivided by allowing a common wife to all the brothers in the family. Polygyny is almost universally allowed in primitive society but rarely practised by individuals. Economic condition is the limiting factor. Tribal chiefs sometimes indulge in large number of wives for economic reasons, like the supply of labour, the desire for children, the luck inheritance of one or more wives from father or elder brother, the sex-craving, for prestige, etc.

In every tribe marriage is brought about by a number of rituals which give social recognition to the union. Dancing, feasting, and music give publicity to and serve as evidence of the union. Some of the rituals symbolise the union of two individuals by tying their clothes, hands or bodies, or mixing their blood. Instances of one or other of these rites are found in all the tribes of India.

Divorce, remarriage and widowhood are also elements of the marital institution. Divorce is quite common among the tribes. Among the Khasis there are few middle-aged persons who have not changed their mates once or twice. Divorce is brought about by a formal ceremony in most of the cases. *Sakamarach*, which literally means leaf-tearing, is the regular

divorce ritual of the Santhals which is performed in the presence of the whole village. The husband and wife tear three sal leaves each and upset a brass pot filled with water with invocations to the Sun-god. The Oraons of Bihar have a very sensible custom which prescribes that a widower must marry a widow or a divorced woman and not a maiden. But human ingenuity has found a way to circumvent this healthy custom by getting the maiden-bride married first to a tree and then to the human bridegroom.

FERTILITY

The data about the life of the tribes are often quite unreliable because much of the evidence does not distinguish between fecundity and fertility of the primitive people. There are two opposite views regarding the fecundity of the primitive people. One view holds that the primitive people had not only an unrestricted but a very high fecundity. The other places primitive people at the bottom of the fecundity scale. Dr. Carr Saunders is of the opinion that "fecundity has increased with civilization." He takes the Indians and the Chinese as intermediate between pre-historic people and the Europeans. Since the time of pre-historic man fecundity is said to have increased, this being apparent in the nature of a modification due to the changed conditions of life. He also traces this increase as biologically determined for the reproductive organs of man have undergone change, those of the more primitive races of mankind being smaller and in all respects less developed than those of civilized races. In other words, there is a connection between lesser development of the reproductive organs and a lower degree of fecundity. This is a statistical conclusion for which sanction has been sought from Biology. It is not possible to prove with our present knowledge of human fecundity that biological differences account for differential fecundity.

Fecundity is the capacity of a woman to bear children while fertility is the actual number born. A woman may have the power of giving birth to twenty children but give birth to only four. In that case, her fecundity would be twenty children, but her fertility four. Under very exceptional circumstances, rarely enough, fertility of a woman corresponds with her absolute power of reproduction, so that the number of children born for which statistics may be available is no measure of fertility, much less of fecundity. The other view is based on the supposed correlation between high standard of living and low birth-rate or as Doubleday thinks, "a deplotheric state is favourable to high fertility and a plethoric state is inversely correlated with fertility."⁹²

⁹² T. Doubleday, *The True Law of Population*, 1843, pp. 5-6.

The fertility of woman varies from tribe to tribe, as it does with the different species, with members of the same species, and often with the same member of the same species. Economic conditions are largely responsible for the difference in fertility between tribes. In agricultural years of prosperity, the number of marriages increases and within a couple of years, the effect is manifest in the large incidence of birth.

According to Dr. Majumdar, the average number of children per family among the Hos is 5.16 per completed fertility, that of Oraon 6; Kuki 6.5; Konds 7.2; and Tharus 6.5.⁹³ The fertility of tribal woman in India appears to be higher than that of those outside India. For, according to Boas, the average number of children born per mother among the Nass River Indians is 4.8; among the Kwakintl 3.5; Utamk 5.3; and Atlakypamuques 5.8.⁹⁴ The survival rate among the Nass River Indians is 55.5%; to 26.6% among the Kwakintl; 64.6% in Utamk; and 41.4% in Atlakypamuques. Compared with these tribes, the figures for the Hos are 67%; for Oraons 65% for Kuki 61%, for the Konds 41%; for the Tharus 52% and for the Saoras 56%.⁹⁵ According to Prof. Krzywicki, the fertility of the tribes, except the Australians and the Negroes is not correct.

That Indian tribes are more fertile than their colleagues in other parts of the world is a fact true probably because the influence of contracts has not been as disastrous in India as elsewhere. Whereas in most parts where the White people have colonised or settled for exploitation of new lands, the tribal people have become extinct or are tending towards extinction, in India either due to isolation or through non-interference, the tribes have maintained their prolific fertility, though the survival rate as found among them can be traced to the widespread prevalence of sexual diseases, syphilis being pretty common among them. Further, the lower survival rate which is traced to high infantile mortality has been brought about by changes in the economic base of the tribes, as many of the tribes originally in the hunting stage have been absorbed in the agricultural stage, and such adjustment has caused discomforts and disintegration of most of their tribal beliefs in the prevention and cure.

It may be pointed out that the fertility is greater among the tribal people than that of the advanced groups, e.g., in Assam in 1931, the average number of children per family among the tea garden coolie castes was 3.4 while that among the hill tribes was 4.7. At every period of marriage duration "hill

⁹³ D. N. Majumdar, *Matrix of Indian Culture*, pp. 87-88.

⁹⁴ B. Boas, *Fifth Report on the Indians of Br. Columbia*.

⁹⁵ D. N. Majumdar, *Op. Cit.*, p. 89.

women" have more children than coolie women and that at the end of her reproductive life a coolie woman would normally have 6 children and a hill woman 7 to 8. If Hinduisation is a higher cultural stage, the Hinduised sections of the tribal population show a lower fertility than the tribals. Even the dying tribes have a high fertility. Westermarck refers to some statements made by different investigators where primitive women are stated to be more or less prolific. We may tentatively conclude, though this would go against the assumptions of Prof. Carr Saunders, that so far as fertility is concerned, the primitive and backward tribes have quite high fertility. Where the tribes have adjusted themselves to the new economic base, the fertility has not slowed down but where there is maladaptation in progress, not only the fertility has been lowered but the incidence of fertility and abortion have also put limit to the size of the families.

The fertility enquiry made in 1931 reveals the following information regarding the fertility of different religious groups in India:⁹⁶

No. of Children per Family			
Community	Number	Community	Number
Tribals	5.0	Hindus	4.3
Christians	5.0	Jains	4.02
Rajputs	4.0	Depressed Classes	4.01
Parsis	4.6	Sikhs	4.1
Muslims	4.4	Buddhists	3.8

From these figures it will be noticed that the people who are at the top of the social ladder—the rich, the urban and the better educated sects—have the low proportion of children. On the other hand, the Christians and the Sikhs who have recruited large number of members from the lower ranks of Hindu society have higher rate. The highest of all are the tribals who are primitives with presumably the reproductive behaviour of the most aboriginal groups. Both Hindus and Muslims fall in an intermediate group, with the Muslims having a substantially higher ratio than the Hindus.

96 Census of India, 1931, I. Pt. I.

Figure: 97

The following are the figures of child-woman ratios by re-

97 Computed from Census of India, Vol. I, Pt. II, 1911, pp. 44-46; 51; 1921, pp. 46-48, 56; and 1931, p. 1931, p. 23.

Community	Children 0-4 per 1,000 Women aged 15-39	Children 0-4 per 1,000 Married Wo- men aged 15-39
Parsis	388	735
Jains	625	804
Hindus	678	817
Buddhists	798	932
Christians	741	966
Muslims	770	900
Tribals	808	1023
Sikhs	841	960
All religions	705	844

From this table similar conclusion can be drawn that the tribals are more fertile than rest of the religious groups in the country. Those religious groups that permit great amount of widow remarriage have apparently a higher general fertility than those that permit a small amount.

It may be mentioned here that if some of the primitive tribes are declining in number or are manifesting a tendency towards it, it is not due to their lower fecundity but the conditions of life which discourage families and make rearing of a large family almost impossible. That the vitality of tribes has not been absolutely impaired will be evident from the proportion of masculinity in the population in different cultural stages. The proportion of masculinity among tribal population is much lower than among the higher castes, e.g., Brahmins had 902 females per 1,000 males, and Rajputs 868, Bhils 981 and Santals 998.

Though the figures for mortality at different age periods are not available, investigations in specified areas have shown the phenomenal absence of aged people among the tribal people. From the Census figures of 1931, we find that the percentages of persons aged 44 and over is higher among the Hindus and Muslims than among the tribes. The Brahmins had 10.19 percent of their total number between the age period 44 and above, but the Saoras 12 percent; Bhils 12.8 percent and the tribal Kolis only 10 percent. While the proportion of aged people is comparatively small among the tribal people, that of children of 0-5 years is decidedly higher than it is among the higher castes; among the Hindus it is 15 percent but among the tribal is 19 percent. The high fertility among the tribal people is off-set by a high infantile mortality and, therefore, the number of children reared by tribal mothers at any time does not exceed those reared up by caste mothers.

CONTROL OF BIRTH

Fertility in primitive society is checked by celebracy, by

restrictions of age of marriage, by long periods during which mothers nurse their young and by various restrictions about sexual intercourse.

Abortion is universal practice among all primitive people, and various methods are known and practised by primitive women. Where pre-marital licence is allowed, and most primitive tribes do allow it, abortion is a necessary evil, for otherwise, the couple have to marry to remove the stigma of illegitimacy on the child born out of extra-marital intimacy. Some tribes use certain magical rites to procure abortion, others use certain decoctions. Most frequently abortion is procured by various violent physical means which are both harmful and dangerous. Many tribes prohibit parturition during the period of lactation and when this period is extended to 6 to 7 years, pregnancies are relieved by abortion. About the Nagas of Assam, Davis says, "It is impossible to resist the conclusion that they are made away with immediately after birth, or that abortion is procured. The Aos have admitted to me that abortion is always procured in such cases. . . . The custom being one that is approved by Nagas, it is impossible to expect them to give information of the occurrence of such cases."⁹⁸ B. C. Allen speaking of the tribes of India living in the hills, says, "Amongst the Kukis, where marriage by service is common, a strange custom is in force. Cohabitation is freely permitted during the time the lover is serving in the house of his sweetheart, and pregnancy entails no disgrace, but the girl must not bring forth a living child. About the seventh month after conception an old woman skilled in such matters is called in. This worthy dame locates the position of the baby's head in the womb, and strikes a sharp blow with a flat stone, with the result that premature delivery takes place, and the child is born dead."⁹⁹

Infanticide among the primitive tribes is due to multiple causes; weak children are often exposed to wild animals strangled or permitted to perish. Sometimes, the grandfather or father struck the infant across its mother's knee and then hit it on the head. Scarcity of food has led hunting groups to put children and old people to death whom they could not feed or who were considered burdens on them in their march for unknown asylums. The constant tribal warfare in NEFA, among the Nagas, produced unsettled conditions and marriage by capture has made weaker clans kill other women, particularly young ones to escape the attention of stronger clans whose frequent incursions for women or cattle have been a constant source of terror to the weaker clans. But for some time past, female infanticide has been much less than before as a result of persuasion and threat by administration.

⁹⁸ Davis, *Census of Assam*, 1891, p. 249

⁹⁹ B. C. Allen, *Census of India*, 1901, Vol. IV. Pt., p. 68.

RELIGION AND LANGUAGE

1. RELIGION

Religion affects the thought and action of a large section of mankind. The influence of religion on man's economic and social life, specially in India, cannot be ignored. By prohibiting certain activities and restricting others, the injunctions of religion not only regulate man's philosophy of life but also formulate the nature of his economic activities and ideals, e.g., Buddhism, with its doctrine of Ahimsa, has made its followers in India, China, Japan, Ceylon, Burma and Indo-China averse to stock-raising for 'meat and wool.' The Eastern regions of the Mediterranean, which are favourable for wine, have not developed any wine industry, because the population is predominantly Muslim to whom wine is prohibited by religion. There is much demand, however, for coffee in place of alcohol in these countries. Among the Muslims banking institutions have not developed because the Prophet prohibited acceptance of interest from borrowers. They eat beef but not pork and hence pig-rearing is quite uncommon among them. The Hindu society is divided into different castes to each of which a certain occupation and certain duties are prescribed by religion. Technological advance in agriculture is hindered by caste restrictions on types of labour, by dietary taboos—for Hindus do not generally eat fish, eggs or meat,—by the ritual value of dung, and by veneration of the cow. According to Hinduism, the cow is a sacred animal and hence, even though it is a source of animal protein it cannot be killed when old or crippled. But Christianity admits of no such restrictions. To the liberality of its principles, the progress of Europe and America can be partly traced. The increasing domination of the Christian people over the earth, the gradual acceptance in all countries of their civilisation and the progress of modern education and culture are all weakening the influence of religion on the economic activities of man. But in a country like ours, religion still remains a vital factor in economic organisation.

Every race has evolved some religion or other. Indeed it is almost impossible to find a race which is altogether devoid of religion. Religious beliefs are moulded by many factors but one of the basic and most important is geographical environment. This factor may be, in some cases, very conspicuous; in others, only just perceptible; but its presence can always be traced. There must be some correspondence between life and thought, and economic needs, and the environment, before any system of religion can gain acceptance as a creed.

Among the very lowest of such beliefs and practices is the fetishism of the Negro tribes of Africa and the various tribes living in the interior of Deccan, consisting of crude worship of inanimate objects believed to be inhabited by special spirits. But higher religions are based on thought and observation of natural phenomena and man's struggle to find an explanation of the mysteries of nature and of life.

Early man had not the slightest idea why the wind blew or the cold increased as winter approached; why the sun rose and set; why the thunder burst, lightning flashed and rain poured from the canopy of the sky—all such wonders constituted mysteries, which he tried to solve and explain by inventing fanciful tales of gods. It is the need of finding causes for effects that has led man to invent a deity; what he cannot understand is explained as the work of a particular god. In such a system of gods, invented to account for different phenomena, the particular environment is bound to exert a prominent influence. Thus, the ocean could not be expected to figure in the mythology of the tribes of interior Asia or Africa; but it did play an important part in the mythologies of India and the Mediterranean countries. Thus the myth of *Samudra-manthan* (or the Churning of the Sea) is woven round the disappearance of the Rajputana sea and the reclamation of lands by the Aryans, with the help of the South-Indian Dravidians. The periodic flow of the Nile waters was a matter of vital significance to the Egyptians and the worship of the Nile became necessarily a matter of religion. The Ganga, Godawari, Krishna, Cauveri, Tapti, Jamuna—are all of primary importance to the Indians for their daily life, for irrigation and navigation.

In all great religions, which take cognizance of life after death, heaven is a place of happiness. But man's conception of this happiness in heaven is coloured by his mode of life, his civilization, and his ideas and ideals—all of which are the products of his environment. The *American Indian's* heaven was a happy, hunting-ground with plenty of game. The Norse 'heaven' was a place of comforting warmth, and 'hell' a place of chilling cold and mist. The Islamic and Christian 'hell' is a place of eternal fire; and of sulphurous heat. The Arab paradise was conceived as an oasis or a garden, with water, trees and fruit. The Zoroastrians and the Persians had much the same conception of 'heaven' and 'hell'. The Hindus have a similar idea, their *Swarga* or *Vaikuntha* being a cool, breezy and luxurious place, while their *Narka* or hell being a region of eternal fire. To the Hebrews living in the semi-desert region of Palestine, in continual terror of the raids of the desert nomads, 'heaven' meant a walled city.

Thus, religious beliefs of people depend greatly upon their

environment, upon the scenery with which they abtruse metaphysical speculations; life in this world is hard enough for them without their diving into the problems of life after death. The Sub-tropical region—between about 30° and 40° latitudes—is thus the best fitted for the birth of great religions of the world. Excluding two Americas and Australia, where the present populations are largely European in origin the sub-tropical zone of Asia has been the birth-place of the great religions which today sway the hearts of mankind. Of these *Hinduism* and *Zoroastrianism* were evolved in the Steppelands of Central Asia—the original home of the Indo-Afghan peoples. *Jainism* and *Buddhism* took birth in the plains of the Ganga: *Christianity* and *Judaism* in the arid lands of Palestine and *Islam*. in the desert lands of Arabia.

The following table gives the world population according to religion (1954)³:—

Christian	799,908,066	Primitive	121,150,000
Muslim	321,931,336	Taoist	50,053,000
Hindu	309,949,000	Shinto	30,000,000
Confucian	300,290,500	Jewish	11,627,450
Buddhist	150,310,000	Zoroastrian	140,000
		Others	348,336,448
		Total	2,443,696,000

Hinduism, which is the prevailing religion in India and Nepal, is believed to have begun about 3200 B.C. in the Vedic period. The Hindu society, whose numerical strength exceeds 300 millions is divided into several castes to each of which occupation and duties are prescribed by religion. People of one group or caste are not generally permitted to perform work of the other caste though they are familiar with it and this affects their life profoundly. The religion of the forest dwellers is bound to be different from those of the plains people. Similarly, the religion of the people who suffer from fog, frost and floods and famines is bound to be different from those of the people who live under bright and sunny skies.

Great religions are ethical codes, social philosophies, the metaphysical speculations into the 'Unknown'; they are concerned with the ordered well-being of life in this world in complex organizations, and the hypothetical conception of life in the spirit-world, and they try to pierce the veil and unfold the great mysteries of Creation, Birth, Evolution, Death and final goal.

³ Encyclopaedia Britannica's, 1955, *Book of the Year*.

These are not concerned only with the worship of *Rain-god*, *fire-god*, *Wind-god*, and *Water-god* but they also provide a code for efficient working of human societies, and prescribe sanctions to enforce obedience to the great commandments; and they offer a speculative peep into the unknown.

Equatorial regions, by reason of the laziness and inertia of the people and the Polar regions by reason of the drudgery which dwarfs man's intelligence and imagination cannot be therefore the breeding places of any but the simplest religions—especially those of 'Spirit-Worship'. The Tropical and the Cool Temperate lands are similarly not suitable for the evolution of mighty religious systems; for in the former case, imagination runs riot, and mythology (clothed in rich imagery and replete with poetic fancies), would take the place of religion. In the latter, the leisure is too little to permit of any religion to follow the profession of other groups. The requirements of modern economic organisation have, however, relaxed the rigidity of the caste system to such an extent, that today it is no longer a force in economic life.

Early *Vedic Hinduism* presents a pastoral religion with great simplicity of thought. The gradual change in the fundamental conceptions of *Hinduism*—from *Vedic* simplicity to the *Upanishad* complexity in harmony with the progress of Aryan invaders, from the original Steppelands of Central Asia to the region of Indus and thence to the still better and richer plains of the Ganges is a striking example of the geographical control of religion.

In fact, *Hinduism* is the final product of a great variety of religious ideas, beliefs and rites, welded together in a composite whole during a long period of growth in which certain things such as cow-worship, the doctrine of re-birth and a conception of an all-prevailing divine energy, and the doctrine of 'Karma' have become fundamental. *Bhagwad-Gita*, *Vedas*, *Ramayana*, *Mahabhart*a and *Puran*as are the important religious texts of Hindus. The teaching of *Gita* says "Action is thy duty, Reward is not thy concern" and a large number of Hindus do believe in this teaching. No doubt some Hindus believe in innumerable gods and spirits, others in a single 'Absolute Being', while still others in no God at all. But while complete liberty is conceded in matters of belief, a strict code of practice is enforced—as seen, for instance, in the reverence of the cow.

BUDDHISM

It was the true religion of a fertile river plain. The robust vigour and uncouth ruggedness that marked the nomadic shepherd of the steppes now gives place to the soft polish and

vivid imagination of the agricultural plains; the religion changes from the simple worship and adoration of gods to abstruse speculations and high moral philosophy. The softer graces of mankind—forgiveness, charity, hope and mercy, the preaching of Ahimsa (i.e., that man should not destroy life in any form), and vegetarianism—are the products of a river basin. The doctrines of *Karma*, transmigration of souls, rebirth, Nirvana (or merger or salvation) as the final goal of creation, are the result of the vivid imagination, great intelligence, leisure and the attainment of a high order of civilization. The birth of this native religion was acclaimed by the people, and the alien Hinduism of the Vedas, though modified by *Puranas* and *Upa-nishads*, was soon displaced. Conversion by the spread of knowledge carried the new religion to all parts of India and it captured the hearts of the dwellers in the other monsoon lands of Asia. Buddhism has existed over 2,400 years and is as regards the number of its adherents the prevailing religion of the world. In its original home in India it is still alive—although its adherents are few—and in moving across the Himalayas to Tibet China, Korea and Japan and in the south to Indonesia, Ceylon etc., the Buddha has become all-compassionate Saviour of Mankind. The followers of Buddhism are averse to stock-raising for meat and wool. That Buddhism should have faded into insignificance in its original home ceases to mystify us when we realise that reformed — or Neo-Hinduism, accepted almost the entire philosophy of Buddhism, differing only in rituals and ceremonies and in the belief in gods and goddesses under the supreme diety — polytheism and monotheism — and diluting the sternness of Buddhist asceticism with a rich mythology; and it thus became more acceptable in tropical India. In Tibet the Great Lama is a priest king believed to be of divine origin — as a reincarnation of a former Buddha-spirit, and so treated virtually as a god in human form.

Confucianism, is the ancient religion of China, to which has been added the teachings ascribed to Confucius (551 to 478 B.C.), and handed down throughout the ages by his disciples. Behind it lies a common substratum of Chinese belief in gods and dragons. The message of Confucius was that the whole duty of man consisted in the negative rule "not to do to others what you do not want done to yourself." To this he added the supreme importance of maintaining a proper relation between subject and ruler, father and son, husband and wife, friend and friend. Temples have been built as centres of religious devotion to Confucius and it is now the State religion.

Shintoism owes much to Buddhism as a fertilizing agent. Shinto was a very primitive system of animism and polytheism, in which a number of spirits and gods were ruled over by the

Sun-Goddess, from whom the imperial line is supposed to have been descended. Thus Mikado has been regarded as the divine king, the Japanese counterpart of the Confucian idea of the State as under the rule of Heaven. The national faith of the Japanese (Shinto) is therefore centred in the Emperor as the unifying force in the nation, who is given divine reverence and respect by virtue of his sacred office and descent.

Christianity. The arid lands of south-western Asia in the Levant gave birth to Judaism and Christianity. The frequent references in the Bible to vine, the fig, the olive, the sheep, and the goat are clearly in harmony with the products of the environment of Palestine. The Jews fall into two main divisions, the one occupying Russia, Central and Western Europe, the other consisting of exiled Spanish and Portuguese Jews, and the Jews of Asia Minor, Egypt and Arabia. In all these countries their synagogues are to be found where men assemble on Saturdays for their Sabbath worship, and at the sacred seasons appointed as Feasts and Fasts in their Calendar.

Christianity is obviously a religion of the Mediterranean region. It too quickly spread to Greece and Italy and it was from Rome, that Christianity spread rapidly outwards. Its spread with advancing civilization to northern climates was natural, but it was just as natural for the North to protest against the comparative complexity; imagery, pageantry and rituals of Roman Church, and to adopt a simpler and purer form of observances.

The Lutheran Church in Germany, the Anglican in England and Presbyterianism in Scotland are illustrations of a progressively simpler faith suiting progressively colder climes. That Christianity spread from Europe to the two Americas and Australia and to S. Africa is a fact due rather to the colonization of these newly discovered lands than to any geographical affinity between them and its home region.

Islam. The desert lands of Arabia needed a sturdier religion than the philosophical Buddhism or the abstruse Hinduism or the practical Christianity, and the great prophet Mohammed (A. D. 569-632) introduced Islam. He began his crusade among the Bedouin of Arabia by the revelation of the One, all-powerful, all-knowing God. The spirit of democracy and brotherhood among the tribes, the suspicion of all aliens and other tribes, regarding all as *kafirs* (unbelievers and heathens), strangely different moral standards, are all teachings of Islam in harmony with life in deserts; and the rapid spread of Islam in the deserts and semi-desert lands of the world extending throughout the northern half of Africa and eastward through the Arab countries and Persia to Afganistan, Pakistan, India,

Indonesia and China and Mongolia — reveals the strange adjustment of this religion with geographical environment. Islam is a religion suitable for desert regions, but it has not the same appeal for the people of other regions. That it has penetrated into the river plains of India is an accident of history and largely the result of forcible conversions; but in Mediterranean Spain it failed to gain a permanent hold, nor did it prosper in the Danubian plains.

In India, there is an over-emphasis on the religious affiliation of an individual. This loyalty to one's religion has coloured the entire political, economic, social and moral life in India. The fact that all the known religions of man have followers in India has been for years a source of disunity and disharmony in India. The presence of different religious groups has created a minority problem and has led to the political partition of the country on the basis of 'religious self-determination.' However, the partition has not solved the Muslim minority problem nor has it created a homogeneous population from the point of view of religion. While Pakistan was created on the basis of Muslim solidarity it has not solved the Muslim minority problem in India, for there are still 35 million Muslims in India, just as there are a few Hindus still living in Pakistan.

The following table gives the absolute number of persons belonging to various religions in India¹:—

Religions		1881	1891	1901	1911	1921	1931	1941	1951
		(In Lakhs)							
Hindus	.. ..	1878	2075	2071	2175	1834	2036	2389	3032
Sikhs	.. ..	18	19	21	30	32	43	41	62
Jains	.. ..	12	14	13	12	11	12	14	16
Buddhists	.. ..	1	2	2	3	1	1	1	2
Zoroastrians	.. ..	8	8	9	1	1	1	1	1
Muslims	.. ..	499	570	624	666	687	776	396	354
Christians	.. ..	17	21	29	38	39	51	58	82
Jews	.. ..	..	..	..	..	..	..	..	..
Tribal	.. ..	64	91	85	102	71	64	248	17
Other (Non-tribal)	.. ..	8	1	1	1	..	..	..	1
Total	.. ..	2501	2795	2838	2928	2173	2414	3148	3567

¹ *Census of India*—Paper No. 2 (1953), Religion, pp. 1-2, (Figures up to 1941 are related to undivided India and for 1951 to Indian Union).

Religious Groupings of Population in India

		Proportion 10,000 of population in								
Religion	1881	1891	1901	1911	1921	1931	1941	1951
Hindus	7432	7232	7037	6939	6856	6824	7589	8499
Muslims	1974	1996	2122	2126	2174	2216	1258	993
Christians	73	79	99	124	150	179	184	230
Sikhs	73	67	75	96	103	124	130	174
Jains	48	49	45	40	37	36	45	45
Buddhists	135	248	322	342	366	365	3	6
Parsis	3	3	3	3	3	3	3	3
Jews5	.6	.6	.7	.6	1	..	..
Primitive	259	323	292	328	309	236	788	47
Others	2	2	4	1	1	16	..	3

In all previous Censuses a record was made of the "Race, Tribe or Caste" of every person interrogated, and the number of individual castes and tribes were tabulated separately. In 1951 census, however, in conformity with the Government's policy of discouraging community distinctions based on caste, such information was collected only from certain special groups of persons referred to in the Constitution as "Scheduled Castes", "Scheduled Tribes" and "Anglo-Indians."

A study of the latest census returns reveals that roughly out of every hundred persons in India, 66 were Hindus; 24 Muslims; 2½ Buddhists; 2½ Animists; 1 Sikh; 1 Christian, and of the remaining three, one may be a Parsi, the other a Buddhist and the third is probably a Jain. After the partition, the religious composition of Indian population has substantially changed. According to 1951 census, Hindus form 85 per cent of the total population; Muslims 9.9; Christians 2.3; Sikhs 1.7; Jains 0.45; Buddhists 0.06; Parsis 0.03 and Tribals 4.47. The above table shows religious groupings of population in India since 1881²

HINDUS

Hindus form about 90 per cent of the population of India. By far this is the largest group found in India. Hinduism holds the third place among the world's great religions, being exceed-

² *Census of India, 1921, Vol. I, Pt. I, p. 110; Ibid for 1931, p. 387; and Ibid for 1951.*

ed in numbers only by Christians and Confucians. All-India Hindu Mahasabha defines 'Hindu' as any person professing to be a Hindu or following any religion of Indian origin and includes Sanatanists, Arya Samajists, Jains, Sikhs, Buddhists, Brahmos, etc. The Census of 1931 has classified Hindus into only three divisions: *Brahmanic*, *Arya* and *Brahmo*. In 1931, an 'Others' category was added to the classification of Hindus. It included a large number of Tribals. According to this Census report :

"The term '*Brahmanic*' has been used for those Hindus who were not returned as belonging to either the Arya Samaj or the Brahmo Samaj or to certain other reforming or segregative bodies, which have been shown together in 'Other Hindus.' These bodies consist of Deo-Samajists, Adi-Hindus, Adi-Dravidas, Adi-Karnatiaks and such sects as returned themselves by these terms in place of the term Hindu"⁴

Thus the word 'Hindu' is a very broad term. Hinduism possesses three important characteristics: first, a doctrine of radical immanence which finds God in everything; second, a tendency towards tolerant syncretism, which allows it to incorporate any ritual or diety of its own; and third, a complex conception of individual destiny, contained in the doctrines of *Karma*, reincarnation, and *Moksha*. Hinduism is bound up with a specific social order, the outstanding features of which are the caste system⁵, the joint family⁶, universality of marriage and prevalence of early marriage.

4 *Census of India*, 1931, Vol. I, Pt. I, p. 513.

It is sometimes difficult to tell whether a given sect is Hindu or not; sometimes Jains classify themselves as Hindus; sometimes untouchables return a new religious name rather than Hinduism and sometimes there is deliberate falsification for political or other obvious reasons.

5 *The Imperial Gazetteer of India* defines caste as a "collection of families or groups of families bearing a common name which usually denotes or is associated with, a specific occupation: claiming common descent from a mythological ancestor, human or divine; preferring to follow the same calling; and regarded by those who are competent to give an opinion as forming a single homogeneous community."—*Imperial Gazetteer of India*, Vol. IV.

Under the caste system the Hindu society is divided into an immense number of entirely separate groups, small and large, the conduct of whose members is restricted by an elaborate code of caste rules. According to Dr. G. S. Ghurye, the salient features of the caste system in India are: (i) Segmental division of society, (ii) Hierarchy, (iii) Restrictions on feeding and social inter-course, (iv) Civil and religious disabilities and privileges of different sections, (v) Lack of choice of occupations and (vi) Restrictions on marriage outside the caste. *Vide Caste and Race in India*, pp. 2-18. Of late the caste system is losing much of its importance due to the spread of education, better communication and the present-day economic struggle.

Among Hindus, the castes are divided among three main types: the functional, the racial and the sectarian. (1) The first one is the most important, representing the

Hindus largely predominate in the central and southern portions of India and in Madras. They are in majority, in Assam, Bihar, Orissa, U. P., Madhya Bharat, Rajasthan, and Bombay. Their regional distribution is given in the table below :⁷

<i>Province</i>	<i>No. in lakhs</i>
U. P.	537
Bihar	342
Orissa	142
West Bengal	194
Assam	58
Madras	499
Mysore	80
Madhya Bharat	73
Bombay	316
Madhya Pradesh	201
Rajasthan	138
Punjab	80
Zone-wise distribution is as follows:	
North India	537 lakhs
East India	749 "
South India	639 "
West India	357 "
Central India	477 "
North-Western India	268 "
<hr/>	
India	3032 lakhs

various occupations that were followed in the earlier times. Instances of functional castes are Brahmin (or priestly class) and the trading (or Bania) castes which include the Kshatries of the East Punjab, the Agarwal, Oswal, Khandelwal, and Jains of Rajasthan. Other functional castes are weavers, carpenters, barbers, washermen; potters, goldsmiths; oil pressers, cattle breeders, etc. (2) The racial classes are numerous in all parts of the country, e.g., Rajbansi, Chandel in Bengal; Bhar, Chero, Kunbis, Ahirs, and Ghosis in U.P.; Jat, Gujar, Meo in Rajasthan and the Punjab; Koli and Mahar in Bombay and Nayar and Paraiyan in Madras. (3) Sectarian castes like those of Lingayat of Bombay.

6 In India, the unit of society is not the individual, but the family. Among the Hindus, this family includes not only the husband, the wife, and the children, but many more members in addition, perhaps three generations with several collaterals, constituting a single household. The family is ordinarily a joint unit both as regards property and worship or consumption of goods. Every member of the family shares in the prosperity or adversity of every other member. Marriage is totally forbidden amongst its members. The institution of the joint family is the basis of Hindu law as regards marriage, adoption, maintenance and especially inheritance and succession.

Unfortunately, the development of communications and transport; the loss or decline of old family occupations; the influence of Western individualism; and the intensification of the struggle for existence are making the system more or less an anachronism.

⁷ *Census of India Paper No. 2* (1953), pp. 8-9.

The following table shows their growth since 1881 :

Year	No. ('000)	% Growth since 1881	Rate of % growth	% of the populatoin
1881	187,849	100	0	75.1
1891	207,560	110.49	+10.6	74.2
1901	206,862	110.12	— .34	72.9
1911	217,197	115.62	+4.9	71.7
1921	216,249	115.11	— 0.45	70.7
1931	236,624	127.03	+10.3	70.7
1941	270.187	143.85	+13.2	69.5
1951	303,320	161.47	+12.2	84.99

Although the Hindus have been increasing in absolute numbers yet since 1881 there had been a steady decline in their proportion in the total population of the country up to 1941. Kinglay Davis attributes three reasons for this state of affairs, viz., (i) the secularization because of the Western influence; (ii) the alteration of the social system and (iii) the growth of other equally important religious groups. No doubt the Hindus gain by absorption of tribal communities, but they also lose heavily by transfer (chiefly from lower ranks) to the Christian, the Sikh, and the Jain communities and the Arya Samaj. Till recently the Hindus did not allow the low-caste people or untouchables to enter the temples or use public places. This sort of nuisance has now been declared to be punishable by the Government. Among such people the Christians and the Muslims found proselytizing fairly easy.

Secondly, the Hindus have a low fertility as compared to the tribal people, or the Sikhs, Christians and Muslims. This low fertility among them is due to the high proportion of widows in the Hindu population who are forbidden to re-marry as a result of which a large proportion of them is unproductive. At the same time, due to the young age at marriage of the Hindus, fewer of them (15.39) are single than in any other group except the Jains. This young age at marriage itself has an adverse effect on fertility.

Since 1947, the number of Hindus in India has increased considerably because of the partition of the country. The Hindus left Pakistan and came to India, whereas only a small number of Muslims left India for Pakistan, so that at present the Hindus are in a great minority in Pakistan.

MUSLIMS

The Muslims are more fertile because they permit widow re-marriage. Muslim women marry almost as universally as Hindu women, and they remarry more frequently. The result is that a higher proportion of women in the reproductive age are married, and this accounts for a higher fertility of the Muslims. But at the same time, as judged by fertility ratios, the married women among the Muslims are more fertile than they are among the Hindus.

After 1941 their number has been reduced to a very low level. This is because of the partition of the country which took place in 1947. The only fact that made partition possible was the concentration of the Muslims in certain parts of India. Out of a total of 435 districts in India in 1941, there were 76 more than half the population of which was Muslim. These representing only 17.5 per cent of all the districts in India, contained about 60 per cent of the entire Muslim population. Among the 76 Muslim-majority districts, there were 50 whose more than three-fourth population was Muslim; and these representing only 11 per cent of all districts contained 39 per cent of all Indian Muslims. At the time of the partition there were 45 million Muslims in India and over 21 million non-Muslims in Pakistan. The Muslim population, however, constituted only 13.4 per cent of the total population of India while non-Muslims in Pakistan accounted for as much as 27.1 per cent of the total population. The inter-dominion transfer of population which took place on account of post-partition disturbances has reduced the size of the minority population of both the countries. Large-scale evacuation of minorities took place from East Punjab including East Punjab states, Delhi, Alwar and Bharatpur in India and from the whole of Western Pakistan. The number of evacuees from West and East Pakistan come to about 10 millions, as against about 7.5 million evacuees from India. The net influx of evacuees into India would thus amount to 2.5 millions. As a result of these population movements the total population of India was estimated at nearly 339.5 millions and that of Pakistan at a little more than 75.5 millions (in 1948). Even after this mass movement of population there still remain 35.5 million Muslims in India and 11 million non-Muslims in Pakistan. The mass migration changed the religious composition of the two countries substantially as would be clear from the table reproduced below:⁸

⁸ C N. Vakil, *Economic Consequences of Divided India*, p. 71.

Communal Composition of Population in India and Pakistan

No. of Muslims	1941		1948	
	India %	Pakistan No. of Muslims	India No. of Muslims	Pakistan % No. of Muslims
Muslims	43 13	51 73	45 17	57 73
Non-Muslims	276 87	19 27	292 86	21 27
Total	319 100%	70 100%	337 100%	78 100%

Islam or Muslim religion originated in the Arab country from whence it spread to Spain in the West, to China, Java, and Philippines in the East with extraordinary rapidity. It was introduced in India towards the end of the 12th century by invaders from the North-West. After that date a large portion of India was controlled by a succession of Muslim dynasties. The Muslims in India today are partly the descendants of the invaders of the past and partly of the indigenous people converted by them. To the former belong the Pathans—tall, muscular, and finely-developed people mainly found in north-western parts, and to the latter class belong the Muslim Rajputs of the Punjab and also Bengal Muslims.

The Muslims numbered 354,00,000 in 1951 and they formed about 10 per cent of the population of the country or about little less than 1/9 of the Hindus. The following table gives their numerical strength since 1881, prior to which period their growth in number is unknown:

Year	No. (000)	Growth since 1881 %	Rate of growth	Population %
1881	49,953	100.00	.....	19.97
1891	57,068	114.25	14.25	20.41
1901	62,119	124.36	8.5	21.88
1911	67,835	135.80	9.2	22.39
1921	71,005	142.15	5.4	23.23
1931	79,306	158.76	11.7	23.49
1951	94,447	189.08	19.0	24.28
1951	35,400	70.87	—62.6	9.93

From 1881 to 1941, the Muslims grew steadily in numbers. This growth is attributable not to the conversion of lower caste Hindus into Muslims but to the higher fertility among the Muslims.

The present regional distribution of the Muslims in India is given in the table below :⁹

Punjab	2 Lakhs
U. P.	90 "
Bihar	45 "
Orissa	1.7 "
West Bengal	4.9 "
Bhopal	1.2 "
Hyderabad	21 "
Assam	19 "
Madras	45 "
Mysore	6 "
Bombay	29 "
M. B.	4 "
M. P.	7 "

The Zonal distribution of the Muslim population is as follows :

N. India	90 Lakhs.
E. India	118 "
S. India	59 "
W. India	34 "
C. India	37 "
N.-W. India	13 "

India has the third largest Muslim population in the world. Indonesia comes first with something like 90 million Muslims, Pakistan comes next with 66 million and India is third with 43 million in a total population of 357 million. Thus in India one out of every 8 Indians is a Muslim. Turkey has 17 million, Egypt 15.9 million, Iran 13 million, Afghanistan 10 million, Iraq 4.6 million and Saudi Arabia 3.5 million Muslims :¹⁰

CHRISTIANS

The Christians have shown a fast growth than any other community in India. Between 1881 and 1951, their number rose to nearly five times and its proportion to the total population was more than doubled. The following table shows their growth since 1881 :

⁹ *Census of India*, Paper No. 2 (1953), pp. 12-13.

¹⁰ *Muslims in India* (Government of India), 1952, p. 3.

Year	No. (000)	Growth since 1881 %	Rate of growth %	Population %
1881	1,778	100.00	....	0.71
1891	2,164	121.58	....	0.77
1901	2,776	156.12	28.4	0.98
1911	3,666	206.17	32.0	1.21
1921	4,497	252.86	22.6	1.47
1931	5,966	335.54	32.5	1.77
1941	7,427	417.65	24.4	1.91
1951	8,200	461.19	10.4	1.74

The Census of India has long enumerated the Christians by 'race,' dividing them into three categories, (i) European and allied races, (ii) Anglo-Indians—descendants of mixed unions, and (iii) Indians. Since 1891 the number of the first two categories has steadily fallen, while that of the third has risen considerably. The Indian Christians are more fertile than the non-Indian Christians. Although they practise late-marriage, yet the fertility for married women is exceptionally high. It exceeds that of all other religious groups except the Tribals. This is due to the fact that a large number of the Christian converts are drawn heavily from the lower strata of caste society, who are generally more fertile than the people belonging to the higher strata and also because this group does not use any type of birth-limiting devices.

The Christians are concentrated in South India where missionary work first started. Out of 8.2 millions in 1951, 5.4 millions or 66 per cent resided in South India. About 33 per cent of the total resided in Travancore-Cochin. Madras also has a good number of Christians. In Northern India the Christians are to be found in places where missionary work has been particularly active either among the tribal people or the members of the depressed classes. The following table gives their regional distribution:

Madras	24.0 Lakhs.
Mysore	1.7 „
Travancore-Cochin	29.0 „
Bombay	5.2 „
U. P.	1.2 „
Bihar	4.0 „
Assam	5.8 „

SIKHS

The Sikhs are much younger in age, as at the time of the foundation of their community in the 16th century they formed a part of the Vaishnava sect. They retained the Hindu pantheon, as well as the Indian social system and the doctrines of *Karma* and reincarnation. But their chief difference lies in their denial of the divine incarnations, their condemnation of idol worship in Hindu temples and their distrust of asceticism. By the end of the 17th century, the sect began to diverge markedly from the Hindu pattern. Being domiciled between the Muslim and the Hindu predominating areas, they have developed a marked tendency towards militant solidarity, as a result of which they had frequently to be at war with the Muslims. They are a brave, well-built and courageous people and hence they are many times more heavily represented in the Indian army in proportion to their population than any other religious or ethnic group in India. In fact, the Gurkhas, who are Hindus from Nepal, have always been outnumbered by the Sikhs in the army.¹¹

Ideologically, they are nearer Hinduism than Islam, but they reject caste; and, though diverse in origin, they have developed by inbreeding and strict discipline into a distinct people, recognisable as such even to a new-comer; their badges as the 'five K'S': *Kesh* (uncut hair and beard), *Kanga* (wooden comb), *Kachh* (shorts), *Kara* (an iron ring in the hand) and short sword or *Kirpan* which they are legally entitled to carry. By religion they are enjoined to eschew tobacco and they do not drink intoxicants and do not smoke.

The Sikhs have always resided mainly in a small part of India—a part of Central eastern Punjab—which is their original homeland. The bulk of them have resided in a triangular region whose three points are near Lahore, Kangra and Patiala respectively, and whose area is less than 10,000 sq. miles.¹²

The degree of concentration is shown by the fact that 90% of all the Sikhs in India in 1941 resided in the Punjab. In 1941, they had a majority in one state of Faridkot, elsewhere they were in minority. The great majority of the Sikhs are now in East Punjab and especially Pepsu, where probably they form the local majority as a result of the expulsion of the Muslims. Some of them are also found scattered in various states of India, as would be clear from the following figures:¹³

11 Raleigh Parkin, *India Today* (1945), pp. 89-90.

12 J. C. Archer, *The Sikhs* (1946), p. 174.

13 *Census of India*, Paper No. 2 (1953), pp. 8-9.

Punjab	3.8 Lakhs
Rajasthan	1.7 „
Patiala and E.P. States Union	17.0 „
Delhi	1.3 „
U. P.	1.9 „

For the last 70 years their growth has been very large. Within the last five decades they nearly tripled their numbers. They have steadily increased their percentage of the total population. In 1881 they formed 0.74% of the Indian population. This percentage increased to .77% in the next twenty years; and the figure reached to 1.74% in 1951. The following table shows their strength, percentage increase and percentage of the total population:¹⁴

Year	Actual number (000)	% Increase since 1881	Decennial % increase	% of population
1881	1,853	—	..	0.74
1891	1,907	+ 2.9	+ 2.9	0.68
1901	2,195	+ 18.4	15.0	0.77
1911	3,014	+ 62.6	12.0	1.00
1921	3,238	+ 74.4	7.2	1.06
1931	4,335	+133.9	34.1	1.28
1941	5,691	+207.1	31.2	1.46
1951	6,200	+234.5	8.9	1.74

The reason for the rapid growth of Sikhism lies in more than one factor. *Firstly*, it lies in the development among them of a strong communal feeling, their realisation of themselves as a political community separate from the Hindus. *Secondly* they accept converts to the fold, so that there has been a very high rate of conversion to the Sikh community. Anyone can be initiated into the religion by a kind of baptismal ceremony (*Papul*). Such converts for the most part comprise members of the depressed classes, agriculturists, and even washermen, tailors, carpenters, masons, and goldsmiths in rural areas who obviously consider that they gain in status as soon as they cease to be Hindus and become Sikhs.¹⁵ *Thirdly*, Sikhs favour widow remarriage and they marry later, as such they have smaller proportions of widows among the women of the age 15-39 than does any other religious group except the Parsis. They have also relatively few single women at these ages. The net result is that they have a greater ratio of married women at the age

¹⁴ *Census of India, 1921, Col. I, p. 114; Census of India, 1931, Vol. I, p. 388.*

¹⁵ *Census of India, 1931, Vol. 17 (Punjab), Pt. I, p. 293.*

of 15-39 than those of any other religious groups. *Fourthly*, they have exceptionally high fertility per married woman (960 per 1000 married women) being ahead of Parsis (735), Jains (804), Hindus (817), and Muslims (900) as against 844 in all religions. *Fifthly*, not only they have high fertility, but they have also a low mortality because of very nutritious diet, healthy living conditions and higher percentage of literacy. Therefore, they have a far larger percentage of persons in the older age groups than any other group.

JAINS

The Jain sect is another off-shoot of the Hindus. It is older than Sikhism, having been founded by Mahavir in the 6th century B.C. It retains most Hindu doctrines, but is distinguished by carrying to an extreme the doctrine of radical immanence. It developed an exaggerated asceticism (particularly in renunciation of clothing) and carried *ahimsa* (reverence for organic life) to almost incredible extremes. The practice of wearing a cloth over the mouth to avoid the accidental swallowing of insects probably gave rise to the report by Megasthenes (C. 302 B.C.) of a race which had no mouth and lived on delicate savours.

Jainism forbids its followers to kill or injure any living thing. They believe that every form of life is sacred. They do not eat after sunset lest they should unwittingly kill some small insect. In diet they are vegetarians. They are a wealthy and charitable community. Many Jains are traders and financiers.

Jains are generally more numerous in U.P., Rajasthan (specially Marwar), North Bombay and Saurashtra, which have over two-thirds of the Jains. Elsewhere they are found scattered in various commercial and industrial centres of the country. They number 1.6 million. Their regional distribution is given below:

U. P.	97 thousands
Madras	35 "
Mysore	22 "
Bombay	571 "
Saurashtra	123 "
Cutch	62 "
M. P.	96 "
M. B.	100 "
Hyderabad	30 "
Rajasthan	327 "
Punjab	37 "

It should be in Muslims

Jains seem to be numerically stationary, and to be declining as a part of the total population, as will be clear from the figures quoted below:¹⁶

Year	No. (000)	% Variation since 1881	Rate of growth %	% of Population
1881	1,222	100	—	0.49
1891	1,417	115.95	15.9	0.51
1901	1,334	109.16	— 5.9	0.47
1911	1,248	102.12	— 6.5	0.41
1921	1,177	94.68	— 7.3	0.39
1931	1,251	102.37	+81.1	0.37
1941	1,449	118.75	+16.0	0.37
1951	1,600	130.93	+10.2	0.44

Many factors may be attributed towards the stationary growth of numbers among the Jains. *Firstly*, they do not allow widow remarriage. Jains have a low percentage of their women at the age of 15-39 married. A fifth of their women in this age group were widows during 1911-31. This enforced widowhood cut down Jain reproduction to a great extent. *Secondly*, they have a low fertility within the marital relation. They have next to the lowest ratio of married women of any religious group being outdone in this respect only by the Parsis. The Jains have approximately 804 children per 1000 married women aged 15-39, the corresponding figures for Hindus being 817, Buddhist 932 and Christians 966. This low fertility among them is due to their social position. They live mostly in urban areas, and are largely literate and very prosperous as a result of which they have low fertility. *Thirdly*, since they do not acquire new converts, this low fertility helps to prevent any growth in their number.

BUDDHISTS

Buddhism now hardly survives in the land of its birth: only a few monks, mostly Nepalese and Sinhalese, are to be found in the holy places, in *Budh-Gaya* where Gautam received Enlightenment and Sarnath where he began his mission. Buddhism originated in the sixth century as a reform movement against Brahminism. In the early period Buddhism had a simple and national humanistic code. It was independent of theism and was far from the more pathological form of asceticism as from hedonism and with an emphasis on fellowship, irrespective of caste or station of life of men and women, and on goodwill. only a few centuries it spread far and wide. During the first

¹⁶ *Census of India*, 1921, Vol. I, p. 910; *Ibid* for 1931, p. 387.

five centuries of the Christian era it spread to Central Asia and the Far East. In the first century it reached China, in the fourth century it reached Korea, in the sixth to Japan, and in the tenth to Assam. By the tenth century it disappeared from India as an active religion.¹⁷ To-day its influence is overwhelming in the neighbouring countries of Tibet, Burma and Ceylon, but in India it is now a minor religion. In 1881, it formed only 0.07% of the Indian population, and only 0.12% in 1941 and this figure further declined to 0.03% in 1951. Deterioration of the creed itself, Brahmin opposition and some persecution, gradually weakened it so that by the time of the Muslim invasion it was strong only in its original home Magadha.

At present the Buddhists are mostly found in Sikkim and the adjoining hills. There are a few in Assam, the descendants either of ancient immigrants from Burma *via* the Hukong Valley or of isolated parties left behind by the army of invasion in the early 19th century.¹⁸

The following table gives their numerical strength in India:

U. P.	3 thousands
West Bengal	81 „
Assam	22 „
Sikkim	39 „

The Buddhists are slightly better educated than the Hindus. They have high fertility ratio and as such they tend to reproduce about as rapidly as the general population. They have a very low proportion of widows but a high proportion of single women. This fact brings the fertility ratio down to about the general average. Their growth is shown in the following table:

Year	No. (000)	Percentage increase since 1881	Rate of growth %	% of Population
1881	167	100	—	0.97
1891	243	145.50	+45.50	0.09
1901	293	175.44	+20.5	0.10
1911	337	201.79	+15.04	0.11
1921	369	220.95	+9.5	0.12
1931	439	262.87	+19.0	0.13
1941	458	274.25	+4.3	0.12
1951	200	119.76	-56.3	.7

¹⁷ The Greeco-Buddhist sculpture of Gandhara, the ruins of the great University of Taxila, and the colossal cliff-figures at Bamian in Afghanistan, attest to the long vitality of Buddhism in North-West, whence it penetrated High Asia.

¹⁸ *Census of India, 1931, Vol. I, Pt. I, p. 389.*

PARSIS

The Parsis or Zoroastrian fire-worshippers came from Persia about the 7th century A.D. to avoid conversion to Islam, and found refuge and freedom of worship on the western shores of India. Here they prospered and became an outstanding commercial and industrial group. This group is most literate (nearly 80 percent of all persons of age 5 and over are literate) and most urban (about 90 percent) and probably the wealthiest of all the religious groups in the country. The following table shows that although they have been increasing gradually in absolute numbers they are not growing so fast as the general population:

Year	No. (000)	Percentage increase since 1881	Rate of growth (%)	% of Population
1881	85	100	—	0.034
1891	90	105.88	+5.9	0.032
1901	94	110.58	+4.4	0.033
1911	100	117.64	+6.3	0.033
1921	101	118.08	+1.0	0.033
1931	109	128.23	+7.9	0.032
1941	115	135.29	+5.2	0.032
1951	100	117.64	-1.3	—

The Parsis are most urban, most literate and above all on the top of the economic ladder, and as such they should have the lowest fertility. But as a matter of fact curiously enough they are growing fast. The reason for this situation may be explained thus. This group has the fewest widows between ages 15-39, and also the greatest number of single women in these ages. The result is that they have the smallest percentage of married females in the reproductive ages; and they have the lowest reproduction per married woman. Their total fertility must, therefore, be extremely low and this explains their slow population growth. But the fact that they are growing at all suggests that they seem to balance their low fertility with an exceptionally low death rate because of a higher standard of living, healthy diet and good stock from which they come.

The Parsis are usually found concentrated in Western India. 97 thousands or more than 50 per cent of them live in Bombay.

TRIBALS

The Tribals form a very small percentage of our total population. They are chiefly concentrated in the barren and sparsely populated tracts of hills and jungles, corresponding in extent fairly closely to east Satpuras but encroaching eastwards and westwards along the Vindhyan ranges through the south of Madhya Bharat plateau in the eastern extremity of Gujrat. They also occur in the outlying parts of the Assam ranges. Their concentration is largely found in Assam, M.P., Orissa, Bihar, Madhya Bharat, Manipur and Rajasthan.

The data on the tribal people's strength are very inaccurate partly because of the difficulty of classification and partly because of deliberate misrepresentation on the part of other religious groups to swell their own numbers. Different estimates have been made regarding their numbers. Some place them at about 30 millions¹⁹ and others at 25 millions.²⁰ According to 1951 Census, the total of the tribal people is of the order of 19 millions.²¹ The numerical strength of a tribe ranges from a few hundreds to more than 2 millions, e.g., Santhals numbered 2.7, Bhils 2.3 and Gonds 3.2 millions in 1941.

The tribal population has been on the decrease since 1911. It may be pointed out in this connection that (i) while the aboriginal population is under ordinary circumstances exceedingly prolific, the majority of them inhabit those parts of the country which are exposed chiefly to the ravages of malaria and hence a large number of them lose their lives. (ii) There has been a real absorption of the tribes into Hinduism in the Assam plains and North Cachar hills. (iii) The spread of Christianity among the tribes in Lushai, Khasi and Jaintia hills as well as M.P., and Travancore-Cochin have also helped in reducing their strength. (iv) Through acculturation, i.e., when a tribe comes into contact with civilization it may accept some of the traits of its neighbours so that their original traits disappear. The tribal dialects are being replaced by Assamese language and tribal beliefs are giving way to the direct onslaught of the inhabitants of the plains.

WORLD'S LANGUAGES

The following are the important languages spoken in different parts of the world²²:—

19 I. Singh, *Development and Adivasis in Asian Labour*, Vol. I, No. 4, 1950, p. 52.

20 *Report of the Conference of Social Workers and Anthropologists for Tribal People in India* (1948), pp. 2-3.

21 *Census of India*, Paper No. 4, (1953); Special Groups, 1951 *Census*, p. 15.

22 *Hindustan Year Book*, 1957, p. 428.

Chinese	480,000,000	Arabic	65,000,000
English	250,000,000	French	65,000,000
Russian	200,000,000	Portuguese	60,000,000
Hindustani	175,000,000	Italian	45,000,000
Spanish	120,000,000	Polish	35,000,000
German	100,000,000	Turkish	20,000,000
Japanese	85,000,000	Dutch and Flemish	20,000,000
Bengali	70,000,000		

Chinese language is spoken by the greatest number of the people of the world. About 500 million people speak Chinese or variation of it such as *Mandarin*, *Cantonese*, etc.

English is the major commercial, scientific and diplomatic language of the world and is most widely used second language in foreign countries. It is used as a first language by more than 250 million people.

Russian has nearly 200 million speakers.

Hindustani the principal language of India is spoken by about 150 million people.

Exceeding 50 million are Arabic, Bengali, Japanese, German, Indonesian, Italian, Portuguese and Spanish.

INDO-EUROPEAN LANGUAGES

The languages of the people of Europe and parts of Asia appear to have come from a mother language which is generally called "*Indo-European*" Language. The *Indo-European* languages are divided into the following:—

(i) *Romance* languages are one of the most important of *Indo-European* language. *Latin* is the mother of *Romance* languages which include *Italian*, *French*, *Spanish*, *Portuguese*. and *Rumanian*.

(ii) *Celtic* includes *Welsh*, *Briton*, *Irish*, *Scottish*, *Gaelic* and *Maux*.

(iii) *Germanic* includes modern *German*, *Dutch*, *English*, *Swedish*, *Danish*, *Norwegian* among its principal languages.

(iv) *Greek* has modern *Greek* as survivor of a group of historical languages.

(v) *Slavonic* languages include *Russian*, *Polish*, *Czech*, *Ukrainian* and *Baltic*.

(vi) *Albenian* and *Armenian* are classified separate in the *Indo-European* group.

(vii) *Indo-Iranian*—consisting of numerous languages of middle and southern Asia spoken by over 300 millions includes *Iranian, Indic* (to which classical Sanskrit is related), *Hindi, Bengali, Kashmiri, Gujarati, Marathi, Rajasthani, Punjabi, Pahari, Urdu, Hindustani* and *Oriya*.

(viii) *Dravidian* languages are the languages of Southern and Central India, northern Ceylon, Malabar, Coromondal. These language are *Tamil, Malayalam, Kanarie, Kulu, Kota, Toda, Telugu, Kurukh, Gondi, Bhili, Malto, Kolani* and *Brahui*.

(ix) *Hamito-Semitic* language prevails in Asia Minor and north-eastern Africa. In this group are such languages as early *Egyptian* (later *Coptic*), *Ethiopic, Armaic, Hebrew, Phoenician, Assyro-Babylonian*, and *Arabic*. Many of these languages are dead, but the peoples of the middle East, north-eastern Africa and Malta speak languages descended from them.

(x) *Malayo-Polynesian* languages include the language of Malaya, East Indies and other islands of the South-West Pacific.

(xi) *Sino-Tibetan* or *Indo-Chinese* include *Chinese, Tibetan, Burmese* and *Siamese* languages.

(xii) *Caucasian*. There are many languages in this group not clearly related. The most important of these is that spoken by the Georgian people in the southern part of the Soviet Union.

(xiii) *Ibro-Basque* is spoken by the Basque people of France and Spain.

(xiv) *Australian*. There are about 100 different languages which are not clearly related but they are spoken by the natives of Australia.

LANGUAGES OF INDIA

The Language composition of a country's population has more than ordinary demographic interest because language is not only a means of communicating with others but also constitutes a powerful tool for developing both the individual and the national personality. It has rightly been remarked that "Language can both be a dash that divides and a hyphen that unites a people". It can create and enhance social, economic and cultural diversities. It is a matter of common knowledge that almost every hamlet and village, every trade and profession, every caste and class cultivates a peculiarity of speech that becomes a badge of identification of that particular group.

India is a land of many languages. The census report for 1901 reached a total of 147 languages. This figure was raised to

222 in 1921, i.e., whereas the population increased from 292 million in 1901 to 316 million in 1921 (without any influx of new or foreign populations) the number of spoken languages increased from 147 in 1901 to 222 in 1921 without the addition of any new or polyglot territory either. The Census Report for 1931 distinguished again a total of 240 'languages' of which Austro-Asiatic and Tibeto-Chinese, which really do not belong to India, number more than 138. Owing to war 1941 census did not include a tabulation of population by languages. The following table gives the names of the languages and the number of people who use them as their mother tongue in order of their numerical strength:—

India's Languages and their Numerical Strength

Languages	Speakers ²³	Speakers ²⁴
	in 1931	in 1941
Hindi	79,221,607	70,000,000
Bengali	53,091,475	54,000,000
Bihari	27,926,509	
Telugu	26,213,087	26,000,000
Marathi	20,888,987	21,000,000
Tamil	20,227,585	20,000,000
Punjabi	15,811,545	16,000,000
Rajasthani	13,897,508	14,000,000
Kanarese	11,206,125	12,000,000
Oriya	11,133,583	11,000,000
Gujrati	10,832,278	11,000,000
Malayalam	9,125,397	10,000,000
Sindhi	4,005,716	4,000,000

Since the numbers are based on the 1931 census they do not give the actual number of speakers, for the population has increased by more than 81 millions during the last two decades (1930—1950). But there has also been a considerable reduction in the number of those who speak languages such as Punjabi, Sindhi and Bengali due to partition.

The 1951 census, which provided for the registering of the mother tongue as returned by the citizen, has enumerated a total of 845 languages or dialects, including 63 non-Indian lan-

²³ The Population of India. According to Languages based on the 1931 Census (Statistical Handbook No. 2) (Delhi, 1947).

²⁴ Indian Year Book, 1948, p. 25.

guages. The table given below shows that 324 million persons or 91% of population returned as their mother tongue one or other of the fourteen languages specified in the Constitution. About 12 million persons (or 3.2%) returned as their mother tongue one or other of the 23 tribal languages, and nearly 18 million persons (5.0%) returned one or other of the 24 other Indian languages or dialects. In each case the total number of persons speaking each of the languages or dialects is over a lakh.

Classification of Population by Mother Tongue²⁵

	No. of Langua- ges or Dialects	Population classified according to mother tongue	Percen- tage to the total
Total Population	845	35,68,79,394	100.0
Languages specified in the Constitution	15 (a)	32,39,72,607	90.8
Tribal Languages with speakers numbering a Lakh and over	23	1,15,31,848	3.2
Other Indian Languages (or dialects) with speakers numbering a lakh and over	24	1,76,98,041	5.0
Less than a lakh	720	28,60,974	8.0
Non-Indian Languages	63	2,26,251	—
Unclassified Population	—	5,89,673	0.2

14 Languages have been specified in the Constitution. Since some persons preferred to return Hindustani instead of Hindi or Urdu, the 1951 census has enumerated 15 instead of 14 languages.

The language returns of the Punjab, PEPSU, Delhi, Himachal Pradesh and Bilaspur State are vitiated by controversy. The returns relating to the languages concerned, namely, Hindi, Urdu, Hindustani or Punjabi, had, therefore, to be lumped together with the result that no all-India total could be specified for persons having the national language—Hindi—as their mother tongue. The following table shows the number of persons speaking the various languages specified in the Constitution and the percentage of each language group to the total:²⁶

²⁵ *Indian Reference Annual*, 1955, p. 27.

²⁶ *Ibid.*, p. 28.

Languages	Total	Percentage to the Total
Hindi	14,99,44,311	46.3
Urdu		
Hindustani (a)		
Punjabi	....	..
Telugu	3,29,99,916	10.2
Marathi	2,70,49,522	8.3
Tamil	2,65,46,734	8.2
Bengali	2,51,21,674	7.8
Gujarati	1,63,10,771	5.1
Kannada	1,44,71,764	4.5
Malayalam	1,33,80,109	4.01
Oriya	1,31,53,909	4.0
Assamese	49,88,226	1.5
Kashmiri	51,086	..
Sanskrit	555	..
Total	3,23,972,607	100.0

The languages of India fall under four great linguistic families²⁵:—

(i) Indo-European or Indo-Aryan,

(ii) Dravidian,

(iii) Austric (in its Austro-Asiatic Branch),

(iv) Sino-Tibetan (mainly in its Tibeto Burman Branch).

(i) *Indo-European or Indo-Aryan*. Which comprises the great languages of Northern India and the Deccan. *Hindi* is spoken in U.P. Eastern Rajasthan and Madhya Bharat; *Bengali* in West Bengal; Tripura and Manipur; *Punjabi* in Eastern Punjab; *Gujarati* in Saurashtra, and parts of Bombay and Kutch; *Marathi* in Madhya Pradesh, and parts of Bombay; *Oriya* in Orissa; *Bihari* in Bihar; *Rajasthani* in Rajasthan; *Pahari* in PEPSU; Himachal Pradesh and in U.P. around Nainital, Tehri Garhwal and Simla Hills; *Assamia* in Assam, and *Kashmiri* in Kashmir.

²⁵ These four speech families with the people who spoke them were known in ancient India respectively as *Arya*, *Dravida*, *Nishada* and *Kirata*. Very few areas in India can show this—the languages of all the four families flourishing side by side, as in Eastern India. The dominant language of course, is the Aryan.

(ii) *The Dravidian Languages* of the Southern and Central India, which include four great literary languages, Telugu (or Andhra) in Hyderabad, parts of Mysore, and Andhra; Kannada (or Karnatak) in parts of Western Mysore States, Coorg and parts of Southern Bombay States; Tamil (or Dravida) in Madras; and Malayalam (or Kerala) in Travancore-Cochin, besides a few less important ones (Tulus of Coorg), some of which are current among the Adivasis, both in South India and in Central and Eastern India. In Eastern India three Dravidian speeches are current. Oroan in South Bihar (the language of nearly $\frac{1}{4}$ of the million of peoples) Malto in Bihar (to the south of the Ganga in Rajmahal hills, confined to over 70,000 people); and Kandh or Kui in Orissa. In Central India the most important of these languages is Gondi spoken in M. P., Hyderabad and Andhra.

The other two language families in India have never been properly cultivated except in two or three instances; and they are current among the more backward, Adivasi groups, i.e., the tribal people. One of these two language-families is—(3) the *Austro speech family* in its Austro-Asiatic branch, under which come Kol or Munda speeches of Central and Eastern India. This group includes Santali (found in Bihar, Orissa, Bengal and Assam); Mundari; Ho; Kharia; Bhuxij; and few others which belong to Bihar. The languages of the Korku is spoken in Madhya Pradesh and Berar; while Savara and Gadaba are spoken in Orissa. Outside of this Kol or Munda group, there is the language of the Khaisis in Assam among the Khasi Hills between Caro and Naga Hills and the Nicobarese in the Nicobar Islands and a large number of languages and dialects which passed into the lands of the East beyond India and are at present current in Burma, Thailand and Viet-Nam.

(iii) The fourth is the *Sino-Tibetan family*. This includes the tribal language of the various people belonging to the different ramifications of the Mangolia race—the Indo-Mongoloids—who are found throughout the Southern slopes of the Himalayas, from Northern Punjab to Bhutan and also in Northern and Eastern Bengal and Assam. Most of the Sino-Tibetan dialects are numerically insignificant speeches and are current among very small tribes. These languages have been divided into various branches within the Sino-Tibetan family. In the Himalayan regions as in Nepal and Darjeeling, the Tibbeto-Burman branch is the most important. This group consists of Murnic, Lepcha, Magari, Kanauri, Kiranti, Newari, Aka, Miri, Mishmi, Dafla, and Meithesis or Manipur languages of Nepal and Assam and Burushaski of the Tibetan family in Kashmir.

Dr. Suniti Kumar Chatterjee is of the opinion that while for the whole of India-cum-Pakistan 71 percent of the people

speak Aryan languages and 20% Dravidian, the speakers of Austric speeches form only 1.3 percent of the total population of undivided India and those of Sino-Tibetan languages only 0.85%²⁶.

In a country like India many have the opportunity to know one or more languages besides their mother tongue and excluding English. Since some States are bi-lingual as Bombay (where both Gujrati and Marathi are the prevalent languages) Madhya Pradesh (where Hindi and Marathi are spoken) a citizen grows up in a bi-or tri-lingual tradition. The present demand for and the possibility of recreation of States based on linguistic boundaries may convey to the outsider that these languages and States are independent and mutually exclusive of each other. The multiplicity of languages is no bar to nationhood. Some of the important states like Canada, S. Africa, Spain, Czechoslovakia, Switzerland, China, U.S.S.R., the states of S. America and Belgium have many languages and people there generally speak more than one language without necessarily "learning" the non-mother tongue, in India also there are many—perhaps some millions who speak two or more Indian languages. Many speak Bengali and Bihari, Tamil and Telugu and Kana-
rese, Gujarati and Marathi, Sindhi and Hindi, Gujarati and Marathi, and other combinations, but the extent of this bi-or tri-lingualism of the Indian population cannot be ascertained for want of statistics.

Too much emphasis, therefore, need not be given to the problem of languages in India. One can travel throughout Northern India and a good part of the Deccan also with a little knowledge of Hindi. But the want of a single national language in India has been long felt. It must be admitted that the imposition of the English language has provided India with a key to great treasures in that language, contact with the advanced West and all that it implies, and perhaps most important a semblance of national, if only linguistic, unity. But the fact that education was imported in a foreign language for these two hundred years and more has been taken as an affront to the culture of the people and it is now accepted that each linguistic region should use its own language and that young people should be educated even at the Universities in their mother tongue. Hindi has been declared as the official language of the country. English, however, will continue to be used for all official purposes for a further period of 15 years.

26 S.K. Chatterjee, 'Languages of Eastern India' in *March of India*, Vol. VII No. 5 (1955) p. 21.

علم و آدنی و حسرت اور پوئش
باج سے انسان پیدا ہوتا ہے
فکرم سے علم پیدا ہوتا ہے
علم و آدنی سے انسان کا پروردگار
بوجہ دل و دماغ کا پروردگار
بوجہ دل و دماغ کا پروردگار
M. J. Farooqi

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